40 Rock

POPULAR Computing WEEKLY

Only 40p.

18-24 October 1984

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Vol 3 No 42

# Spectrum+ surprise

SINCLAIR, in a surprise announcement, has launched a new machine — the Spectrum+.

The machine will be in the shops this month and will cost £179 95

What you get for your money is a 48K Spectrum in a new case with a QL-type 'professional' keyboard The machine is fully software compatible with the existing 48K Spectrum and included in the £179 95 price is an 80-page full colour manual and six free software programs. *Scrabble*, *Chequered Flag*, *Tasword 2*, *Chess*, *Vu-3D* and *Make-a-Chip*

The Spectrum+ is also fully compatible with ZX Interface 1 and 2 and microdrives.

Sinclair will continue to sell the 48K Spectrum, priced at £129 95, and the ZX Expansion System — with which the Spectrum+ is compatible — will continue to sell at £99 95.

"We have been listening to all the people who have been saying that the Spectrum needs a good keyboard," explained a Sinclair spokesman.

He denied that the Spectrum was a reaction to falling Spectrum sales. "The classic wrong thing to do is to wait for your leading product to mature before doing anything about it. The Spectrum is still the number-one selling machine and I think that our share of the market come Christmas will be

continued on page 5




## Micronet settles on fight with Compunet

A BATTLE of the databases now seems inevitable as Micronet plans a November launch for its own Commodore 64 viewdata and telesoftware service — a direct rival to Commodore's own, recently launched, Compunet system.

Micronet's C64 modem package, using the Prism modem 1000 unit, will cost 4p less than the Compunet system — £99 95 compared with £99 99.

Commodore 64 owners who opt for the Compunet modem hoping also to access Micronet — as advertised by Commodore — now seem likely to be disappointed By paying an additional £5 Compunet users will be able to buy British Telecom's viewdata software package giving access to Micronet and Prestel, but Compunet modem owners will not be able to use any of Micronet's interactive services — they will not be able to down load software from the system or upload information.

This is because the Sacon Rom software necessary to access the interactive services on Micronet is available only to Micronet subscribers "This software is unique to us," confirmed Micronet's John Prout.

## Ocean buys Imagine left-overs

IMAGINE'S name and remaining assets have been bought by the Manchester software house, Ocean.

Ocean last week announced it has competed negotiations for the purchase from Imagine's liquidator, Christopher Chambers of Arthur Young McClelland Moores of the major portion of the failed company's assets including its name,

continued on page 5

Ocean's managing director David Ward

# KoalaPad™ TouchTablet

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# )View

There is nothing wrong with a bit of healthy competition between micro-companies — it keeps them on their toes and encourages them to offer better products and services

Occasionally though such competion can act against the consumer's interests.

Now we have Micronet, the BT-Prestel Telemap venture, and Commodore's Compunet both competing in the — so far — comparatively small networking market for Commodore 64 owners They are both producing their own modems and, while each can be used to view the other's system, only the Micronet modem can be used to access any of the Micronet's system's interactive services — down-load software, send messages or access its teleshopping service. And it seems likely that the converse will also be true — that Micronet modem owners will not be able to down-load Compunet software or access Comp-u-Card.

What this means is that any Commodore 64 owner wanting to use both services to the full will have to spend £200 rather than £100 and buy two modems rather than one

Which all seems extremely short-sighted At such an early stage in the development of interactive consumer services surely now is the time for co-operation. As it is, people may be uncertain which service to choose and end up joining neither

BT — which approves such systems — should perhaps step in and indicate some sort of communications standard.

And is it also a good idea that BT should have a commercial involvement with one particular system?


POPULAR Computing WEEKLY

Vol 3 No 42


# )Presents...



# )Futures...

Astronomy program for the Electron ... a new print routine on the Spectrum ... part 2 of the QL Disassembler


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**How to submit articles** Articles which are submitted for publication should not be more than 2000 words long The articles, and any accompanying programs, should be original It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted **Accuracy** *Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

**Computer Trade Association Magazine of the Year**

## Oric served writ by Durrell

NOTWITHSTANDING last week's vote of confidence in the financial viability of the company from its major suppliers, Oric has now been served with a writ by Durrell Software for non-payment of a £4,000 debt resulting from tapes supplied by the software house to Oric. Commented Oric spokesman, "Durrell will be paid as soon as possible.

"Oric's recent cash-flow problems have been widely reported and as a result of the meeting of major suppliers Oric now has the time it needs to sort itself out.

"The company has £8m worth of outstanding orders and its cash flow problem is already showing signs of easing."

## Ocean

continued from page 1

logo and trading style.

Ocean intends the Imagine name to be used for a range of new prestige titles. Commented Ocean's managing director David Ward, "We intend to sell a limited number — half a dozen a year — of state-of-the-art games under the Imagine label.

Among the first titles to be released by Ocean will be a completed Imagine-written game also acquired from the liquidator — *Baseball*, for the Commodore 64.

As well as taking over the Imagine name, Ocean has also employed a team of eight ex Imagine programmers to work on the development of a number of new titles for the Ocean label including an animated strategy adventure, due for release at the end of November.

The eight-strong team is the same one — led by John Gibson — which developed the *Bandersnatch* megagame for Imagine, recently sold to Sinclair (see *Popular Computing Weekly*, October 11).

"They will work for Ocean as a separate programming cell in Liverpool on a twelve month contract", explained David Ward.

## Two more MSX micros

THE MARCH of MSX continues with two more Japanese companies announcing MSX compatible machines.

Yashica — best known in the UK for its camera equipment — has launched its YC-64 64k micro. No price details are yet available but first machines are expected to arrive in Europe at the beginning of next month.

Sega, the top arcade game manufacturer has also announced an MSX home micro — the Yeno DPH-64. Although Sega is best known in this country for arcade games like *Frogger* and *Zaxxon* it sold 120,000 home micros in Japan last year and its previous machines — the Yeno SC3000 16K and 32K models (all Z80A based) have been marketed in other European countries — though not the UK. No details of price or delivery times for the DPH64 MSX machine are so far available.

## Disc drives for the QL from Quest

QUEST Microsystems is shortly to announce a range of disc drive units for the QL, starting with a single Sony 3½ inch microfloppy device and including a Winchester hard disc.

The company is also announcing additional memory, and business software to accompany its previously announced CP/M 68000 version of CP/M. The CP/M 68000 system does not require a Z80 processor — commercial Basic programs are simply recompiled.

Whilst prices for the disc options are not yet known a Quest spokesman said they would be "in line with the price of the QL, ie cheap." The single disc drive add-on is expected to retail for close to £100.

Paron are known to be working closely with the company on software support for the new QL peripherals.

## Spectrum+

continued from page 1

very positive.

"This time it is not perhaps a very innovative product — but it is a very clever piece of marketing and repackaging.

"With the six bundled software packs the Spectrum+ represents extremely good value."

## C64 music keyboard

COMMODORE has launched a music keyboard add-on for the C64 which simply clips over the existing computer frame and, by a mechanical action, presses down on the keys below to produce a note.

The music keyboard comes with software to use the Commodore as a simple synthesiser with up to three-note chords, eight pre-set sounds and simple rhythms.

The package — on sale next month — which also includes a songbook containing some simple tunes, has been produced for Commodore by Music Sales and will retail for £29.95.



## 7th record year for Commodore

COMMODORE, in announcing its financial results for the year to June 30, 1984, has shown a further period of solid growth.

Sales are up by 89 per cent compared with the previous year to $1.27bn and profits have increased by 63 per cent over the same period, up to $143.8m.

It is the seventh successive year of record sales and net earnings for the company.

Commodore share prices however fell in the last quarter of the period to June 30 resulting from investor uncertainty following the departure of the company's founder Jack Tramiel in January and his subsequent reappearance as Chief Executive of Atari.

## BT games

BRITISH Telecom's game software venture, Firebird, will follow its first three budget-priced £2.50 titles launched next month — *The Wild Bunch* (Spectrum 48K), *Booty* (Commodore 64) and *Bird Strike* (BBC) — with another 16 titles.

These are *Run Baby Run* and *Menace* (Spectrum 16K), *Mr Freeze, Exodus, Booty, Terra Force* and *Viking Raiders* (Spectrum 48K); *Head Ache, Mr Freeze, Exodus,* and *Zulu* (Commodore 64) *Mickey the Bricky,* and *Snake Bite* (Vic20), and *Gold Digger, Acid Drops,* and *Duck!*

# REAL ARCADE ACTION! FROM JETSOFT



# Letters

## 'Rotten' Spectrums

I have just read your article in the August 30 issue about cassettes being pirated by the Portuguese company Microbaite.

Last year I bought a Spectrum from Timex in Portugal (which came complete with a *Horizons* cassette translated into Portuguese by Alfa Micro). Timex has, according to a recent newspaper report over here, sold 30,000 Spectrums in Portugal.

Since my purchase the computer has had to go back to be repaired by Timex more than seven times within the six-month guarantee. As a result I have only had the computer for seventeen days. Then the guarantee ran out and the machine malfunctioned again and I didn't know what to do.

I decided to visit a lawyer to try and find a way of getting the money I spent on repairs back.

He took a look at my Spectrum and advised me that there was nothing he could do.

This was because my machine had no serial number, and no marking on the case indicating country of origin or manufacturer.

We came to the conclusion that my machine was a 'pirate' Spectrum copy.

At the time I decided to keep quiet and give up trying to get my money back but, after reading your article I screw up my courage. And here I am.

I hope you will understand why I do not want to identify myself.

*A disappointed Spectrum owner*
*Lisbon*
*Portugal*

## Disgust — 1

Either David Riley (Letters, October 4 issue) is deliberately trying to harm Automata's reputation of providing positive entertainment, or he doesn't know his lower-dorsal-sphincter from his outer-mid-arm-joint.

How dare he twist the creative optimism of *Deus ex Machina* by finding the struggle of a non-conformist against repression "indecent". We work hard to entertain *Popular Computing Weekly* readers with our back cover comic strip every week, and I take a very dim view of this sort of "yours disgustedly" hypocrisy.

What about the adverts in the same issue which invite you to kill in order to "win", to buy replica firearms, and to commit genocide. If I didn't laugh I would despair.

*Mel Croucher*
*Automata*

## Wilf-ful thinking

*Ode To John Minson*

This *Kokotoni Wilf* is popular
is plain for all to see
It's rising fast through all the charts
Which causes us much glee.

Your reviewer young John Minson
Who gave Wilf quite some welly,
Says "This is such a super game,
I'll give it four times one telly."

Now the only adverse comment passed
Which made my hair start thinning,
Was "When your sixth Wilf is lost
You must go back to the beginning."

For this is not the truth you know
Your choice of start is free
To begin in a different place
Just press keys two or three.

Thanks for a rave review of *Kokotoni Wilf* all the same.

*Steve Wilcox*
*Elite Systems*

*"Did you have to go and buy Imagine's Trading Style as well?"*

## Tacky tribe

I would be extremely grateful if you would print my letter as I was one of the first to complete a fantastic new game *Kokotoni Wilf* by Elite.

This morning I received a letter saying that if I could get my letter printed in any magazine I would have the chance of meeting Lee Majors, star of Elite's next game, *The Fall Guy*. So here is my letter:

"I would like to say to your readers just how brilliant the game *Kokotoni Wilf* is. After buying it I have been hooked ever since. The game, structure and graphics are all truly amazing."

*Matt Woodley*
*32 Hatharop Road*
*Hampton*
*Middx*

**Identical communications were also received from: Sean Townsend, Simon Davies, G N Hawkins and Darren Hallett, all of whom, it would appear, are easily bribed.**

**Bit tacky, Steve.**

## Disgust — 2

I thought your readers (and Automata) would like to know that I was responsible for the sketch of Alice Cooper on the dustbin in the first frame of the Pimania back-page cartoon advert in the October 4 issue.

It proves that Automata is the most human company around. I had just woken up after a four-day party (lots of drink, heavy music etc) at 3 o'clock in the morning.

I had no-one to talk to so I rang up Automata's answering machine and had a ten minute conversation about Alice Cooper. The next week included in their cartoon was a picture of him — which really made my day.

So, thanks Automata and don't believe rubbish like the letter in the same issue from 'disgusted of Birmingham'.

*Anon*

PS Readers, go and buy some Alice Cooper music — it's still published!

## Below par champion

I thought you might be interested in the ad from Sinclair for the QL now appearing in the colour magazines.

The advert shows a truly impressive display of the Psion QL chess program which recently won the 1984 Microcomputer Chess Championships (see September 27 issue).

The interesting point is that, in the picture, the board is set up incorrectly — the black king and queen are on the wrong squares — the queen should be on a square of its own colour.

Perhaps the bugs are still alive and well in the QL? Or perhaps the standard of the opposition in the championship was a bit below par!

*Philip Reynolds*
*6 St George's Street*
*St Annes on Sea*
*Lancashire*

## Vic reassurance

After reading your magazine again this week I find that there are no software listings specifically for the Vic20.

This is very annoying as there are 1½ pages on the QL and a page on the Amstrad.

I don't want to knock these machines but there must be more Vic owners than QL and Amstrad owners put together.

Us Vic owners seem to be left out in the cold by all the flashy new micros of today.

*J J Longworth*
*6 Melita Street*
*Darwen*
*Lancs*

**Not at all. While we obviously have to cover the new machines, there is no question of letting the Vic fade away. There is a Vic20 program in Open Forum this week and there will be a Vic20 Star Game in the November 1 issue.**


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# Most software companies assume you look like this.

There are plenty of software packages around to help control businesses. Most of them do some of the things you require very well indeed.

The trouble is, they can be rather a handful. You need one disc for word processing, another for spreadsheet.

One for database, another for graphics and so on. Each with its own set of commands.

Lotus Symphony does everything any office is likely to need on one disc.

It puts you in touch with others. No man is an island and Symphony's communications let you receive and send data back and forth between your mainframe and other computers.

It does your word processing. After all, once you have all your data together, you don't want to start again with another disc to put it into a letter.

It gives you an enormous database with access to, up to 8000 records.

And its spreadsheet is the largest and most advanced there is with 8192 rows by 256 columns.

Colour graphics are a buzz word these days, so Symphony gives you seven. All of which are available at a single keystroke.

Symphony also caters for people who like to see everything at once.

So you can have spreadsheet, database, graphics and word processing all on screen at the same time. Each in its own window.

Then you can zoom in and out and shuffle them around like papers on a desk. Also with add-in applications, Symphony can grow with you, so there are no limits to what it can do.

Yet although it does the work of many, Symphony is easier to operate than some dedicated programmes.

But if your needs are simpler there's still Lotus 1-2-3.

It covers the needs of most offices (spreadsheet, graphics and database) on, of course, one disc.

Because one thing Lotus always assumes is that you only have one pair of hands.

For further information on Symphony and Lotus 1-2-3 (still the biggest selling software package in the world) call Teledata on 01-200 0200.

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## Up-market

**Machine** *Einstein* **Price** £499.99 **Supplier** Tatung UK Ltd Computer Division, Bridgenorth, Shropshire WV15 6BQ

Tatung are a Taiwanese company that took over the Decca factory in Shropshire: they still produce goods under the Decca banner, but are using the Tatung title for their more up-market products. The Einstein is aimed at the top end of the home market, as well as having educational and business aspirations. A Ram based machine, with 64K for languages and programs and 16K for the video display, it has an 8k Rom to hold the machine's own operating system. With Basic loaded there are 43324 bytes free. The computer also boasts a 3" disc drive, all for £499.99.

You get a big computer for the money: a 14" colour TV sits comfortably on the flat area behind the keyboard. Removing the top reveals a well laid-out interior: the shielded power supply occupies one corner, but the main circuit board fills the rest of the space — it is about 12" square. There are no custom chips in evidence. the Z80A CPU runs at 4 Mhz and is accompanied by two Z80 support devices, a P10 and CTC. Studying the rest of the board is like playing spot-the-chip, RS 232 drivers from the QL, the PAL encoder in the Spectrum, the same sound generator as the MSX machines. Connectors are of a high standard, the only board edge used is on the Teac manufactured disc drive.

The 3" drives are mounted so that the second drive upgrade kit can be fitted by the customer; all that is needed is a cross-headed screwdriver and a little confidence. The discs are a pleasure to use, fast and very quiet. Loading, for example, the 16K of Basic takes less than ten seconds. One pleasing feature is the two-colour LED on the front panel which lights up green if you are reading side A, red for side B.

I have a few reservations about the keyboard, the feel is fine, but I would expect double-sized shift keys on a micro of this price. The cursor, insert and delete keys are also the victims of false economy as only three keys are provided and need to be used in conjunction with a hard-to-find shift key: what would otherwise be so excellent screen editor is spoilt by this arrangement. Eight function keys provide 16 programmable functions which can aid programming or, by imbedding a CR in the text, used to perform commands. I found them handy when programmed to switch between monitor, DOS and Basic.

The sound facilities of the Einstein are about average. The AY3-8910 provides one noise and three tone channels; from Basic you can get at the registers directly with the PSG command, or allow software to do the work for you by using *Music*, *Voice* and *Tempo*. The quality of the effects possible are enhanced by a 0.5 watt speaker which lives behind the grille above the keyboard, a volume control is provided.

Screen graphics are very similar to those of the Memotech, Sord and MSX range of machines as the video controller is a Texas Instruments chip with 16 colours (including transparent), 32 or 40 column text display and 32 planes of sprites. The pixel resolution is 256 by 192 but the colour attributes file is not so generous: if you try to draw a line of one colour over a block of another, the fact that the horizontal colour resolution is restricted to 32 blocks of eight pixels will become apparent. Well-written programs should be able to avoid this problem (the colour resolution is still better than the Spectrum, for example) and the problem does not affect he sprites. A UHF TV output is the cheapest way of getting a picture out of the Einstein, but a monitor socket also gives either RGB or YUV signals colour signals. Tatung hope to sell their matching colour monitor (£240), so the monitor output is set to give YUV (luminance and two colour difference signals): adjusting for RGB is simple, however.

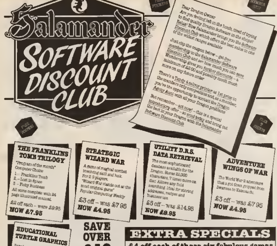
An 80 column card is available. It was not provided with the review machine, but was on display at the PCW show. Not so much a card as a box, it fits neatly over the Pipe (Tatung's name for the bus expansion connector), and provides a monochrome video output and extension Pipe socket. Costing £50, it is an essential extra if you wish to use most CP/M programs.

Switching on without the system disc in place brings the machine up in MOS, which on its own can be used as a machine code monitor. If the disc is in place then the Disc Operating System loads automatically. It is this part of the software that gives CP/M compatability, the only problem being the unusual disc format. Type XBAS when in DOS and Crystal Basic will load from disc. This is an extensive version of the language, written by a British software house. The only problem I see is the inclusion of a command rather than any omissions. *Pop* forces a return from a subroutine, not to the calling routine but to the routine that called the calling routine! Probably very useful, but it may well cause brain damage when debugging programs.

The Einstein kept reminding me of the Dragon — perhaps it was just the diamond-shaped zeros the text display produced. In theory, software should not be a problem. Tatung are making arrangements to get CP/M software available in 3" format, although don't expect it to be cheap. MSX software should also convert easily.

The obvious comparison is with the QL. If I had to choose which to buy it would not be an easy decision — the Sinclair machine is much more advanced, but the extra cost of the Einstein does include a reliable disc drive. Although there must be a worry about to what extent the Tatung will be supported by the major software houses — there isn't much available at present — the CP/M capability probably insures against the possibility of being left completely high and dry.

**Jeff Naylor**




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# Mad Maze

**Steady as you go, as you make your way through the Mad Maze written for CBM 64 by Chris Lea**

On running, the program produces a maze over most of the screen, completely at random.

A white ball appears at the top of the screen, and the time is set to zero

The object of the game is to move the white ball through the maze to the bottom of the screen

Crashing into the walls returns the white ball to the start position. Instructions are included in the program.

**Program Notes**

Z = Up
X = Down
> = Left
< = Right
I = Instructions
Q = Quits maze and draws new one.
This may be necessary if the randomly produced maze is impossible to negotiate.

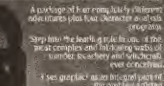
**Listing Notes**

Line 15 — the 's' is the Clr/Home
Line 2010 — 'e' is Shift/E Graphic
Line 3135 — '?' is Y Graphic
Line 3210 — 'z' is Ctrl/Reverse Off

```
0 GOTO3010
1 CLR
10 POKE53201,11:POKE53280.13
15 PRINT ε
30 FORY-1106TO1906STEP40 POKEY,160.POKEY
+54272,5:POKEY+36.160:POKEY+54300,5
35 NEXTY
40 A=1147
50 FORC=1TO20
60 FORB=ATOA+34
70 R=INT(RND(1)×13+1)
80 IFR<6THENPOKEB,160.POKEB+54272,5.GOTO
90
85 POKEB+54272.11
90 NEXTB
100 A=A+40
110 NEXTC
120 TI$= 000000
125 L-1124 M=L+54272.POKEL.81.POK M 1
130 POKE198,0
140 GETQ$ IFQ$-   THEN140
145 IFQ$= I THEN3040
150 IFQ$- Q THEN 1
155 IFQ$=   'THENX=PEEK(M+1)AND15:IFX=5TH
ENPOKEM,11,GOTO125
160 IFQ$= .'THENPOKEM,11:L=L+1.M=M+1?POK
EL,81:POKEM,1
165 IFQ$=', THENX=PEEK(M-1)AND15:IFX=5TH
ENPOKEM,11.GOTO125
170 IFQ$= , THENPOKEM,11:L=L-1:M=M-1:POK
EL,81:POKEM,1
175 IFQ$='X"THENX=PEEK(M+40)AND15:IFX=5T
HENPOKEM,11:GOTO125
180 IFQ$='X THENPOKEM,11:L=L+40:M=M+40:P
OKEL,01:POKEM,1
185 IFQ$= Z THENX=PEEK(M-40)AND15:IFX=5T
HENPOKEM,11:GOTO125
190 IFQ$= Z THENPOKEM,11:L=L-40:M=M-40:P
OKEL,01:POKEM,1
200 IFL>1983THENGOTO2000
210 IFL<1103THENPOKEM,11:L=L+40:GOTO125
220 GOTO130
2000 POKE53280,2:POKE53201,15
2010 PRINT se
2012 IFTI$> 000130 THENPRINTTAB(11) QQQQ
QDID YOU GET LOST? :GOTO2025
2014 IFTI$> 000100 THENPRINTTAB(13) QQQQ
QWHAT KEPT YOU? :GOTO2025
2016 IFTI$< 000010 THENPRINTTAB(15) QQQQ
QBRILLIANT!! :GOTO2025
2020 PRINTTAB(14) QQQQQQYOU MADE IT'
2025 PRINT:PRINT
2030 PRINT 111YOU TOOK  LEFT$(RIGHT$(TI$
,4),2)  MINUTES AND  ,
2035 PRINTRIGHT$(TI$,2)  SECONDS
2040 FORT=1TO2000:NEXTT
2045 PRINTTAB(14) QQQQANOTHER GO ?
2050 PRINT:PRINTTAB(15) ( Y OR N )
2055 POKE190,0
2060 GETP$:IFP$=   THEN2060
2065 IFP$= N THEN END
2070 IFP$= Y THENGOTO1
2080 GOTO2055
3000 REM xxx TITLE PAGE xxx
3010 PRINT sQQQQQQQQQQ :POKE53200,9.POKE
53201,9
3020 PRINTTAB(12).FORU=1TO16.PRINT px .
NEXTU
3025 PRINT.PRINTTAB(12) xxx MAD-MAZE xxx
3030 PRINTTAB(12).FORU-1TO16.PRINT px .
NEXTU
3035 FORT-1TO2500.NEXT
3039 REM xxx INSTRUCTIONS xxx
3040 PRINT so .POKE53200,12.POKE53201,12
3050 PRINTTAB(14) INSTRUCTIONS
3060 PRINTTAB(14) eeeeeeeeeeee
3070 PRINT Q11THE COMPUTER WILL CREATE A
 DIFFERENT  MAZE EVERY TIME YOU PLAY.
3075 PRINT
3080 PRINT 11YOU HAVE TO GUIDE THE BALL
(E q p) FROM THE TOP OF THE MAZE   .
3090 PRINT TO THE BOTTOM. IN   AS SHORT
 A TIME AS POSSIBLE. IF YOU HIT .
3100 PRINT THE WALL'S YOU WILL BE RETURN
ED TO THE  START
3105 PRINT
3110 PRINT 11IF YOU WISH TO QUIT A MAZE ,
 PRESS 'Q'
3120 PRINT AND A NEW ONE WILL BE DRAWN!
3130 PRINTTAB(4) USE KEYS
3135 PRINTTAB(4) 7777777
3140 PRINTTAB(6) UP     'Z'     : DOWN  -
 'X
3150 PRINTTAB(6) QLEFT = '<'     : RIGHT
= '>'
3160 PRINT Q  PRESS 'I' TO RETURN TO INS
TRUCTIONS
3200 POKE198,0
3210 PRINTTAB(6) Q&R PRESS ANY KEY TO CO
NTINUE r
3220 GETK$.IFK$=  THEN3220
3230 GOTO1
```

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# Hardware Review

## 3 Octaves

**Hardware** *Echo 1 music keyboard* **Micro** BBC **Price** £99.95 **Supplier** LVL, Scientific House, Bridge Street, Sandiacre, Nottingham.

The biggest problem with any musical use of a micro, whatever the quality of the programming and the sound chip is the qwerty typewriter keyboard. Quite simply it is impossible to play in anything like a conventional keyboard manner — thus all pretentions to 'teaching' music are severely limited.

One attempt to overcome this problem came recently from Commodore who has introduced a simple mechanical, clip-on keyboard in which pressing a plastic 'key' presses down on a qwerty letter and produces a note, but though cheap it is limited to one octave and the actual keys are tiny

A more professional solution comes from LVL — a real three-octave keyboard with full-size music keys that plugs into the user port of the BBC (soon also for the Commodore 64) The device comes complete with software for the 64 to drive it and even has a six watt amplifier as an optional extra.

It's a keyboard you can actually play whether you are a one finger amateur or a three-fingered professional (well, there are only three channels to play around with so there is a top limit of three note chords)

There are two elements to the package: the keyboard and the software.

The keyboard is solidly made with a metal and plastic case and plastic keys. In comparison with the keyboards found on, say, Casios and small synthesisers the action (how much force you need to press the key down and register a note) is heavy Whether you think that's bad or not is somewhat a matter of taste and in any event it may loosen up with a few months play With a little care the keyboard should last a long time — it looks tough and reliable

To set the system up the keyboard is first linked by ribbon connector to the BBC user port and then the software (on cassette or disc) is loaded up If the keyboard is incorrectly connected you soon know it as the BBC lets out an almighty shriek.

While it is difficult to fault the keyboard it is nothing without software This in turn depends on the BBC sound chip which is unfortunately, in comparison with dedicated music keyboards, no better than functional. To get interesting sounds from it takes quite a bit of programming

The Echos sound software on disc or cassette is supplied free with the keyboard and operates in two basic modes — organ and synthesizer The difference is less the kind of sounds produced and more that the organ consists of 17 pre-set sounds labelled things like piano, organ, mandolin, whereas the synthesizer mode lets you design your own sounds and store them in one of four presets where they then become available at a single key-press.

In the organ mode the pre-sets are simple enough, each qwerty key is labelled with what sound it produces although (and here's the rub) they all sound the same and none of them sound anything like their label: piano is a pleasant but unexciting organ-type sound and mandolin is the same 'piano' sound with the jitters.

If you accept that — for reasons which are totally to do with the relative lameness of the BBC sound chip rather than the Echo-sound software — the sound choices must be limited, you can still have a lot of fun. Some of the pre-sets like viola and hawiian actually sound pretty pleasing — the latter 'boings' rather authentically.

There are a number of additional features that may be introduced alongside the pre-set choice. Mostly these use white noise — *base* adds a background buzz at the same pitch as the note pressed, *snare* produces a short burst of white noise as the key is pressed. Other keys enable the pitch to be changed as well as the duration of any note

In the synthesizer mode simple cursor key presses enable the parametare of the sound to be changed using the usual BBC envelope functions. My criticism here is that there is no explanation of what each parameter represents — you'll need the BBC manual for reference

The software is, in general, pretty good — certainly enough to get you going There are some features I'd have liked — how about a pitch bend option in which one of the top or bottom keys is allocated to bend played notes up or down by a given pitch?

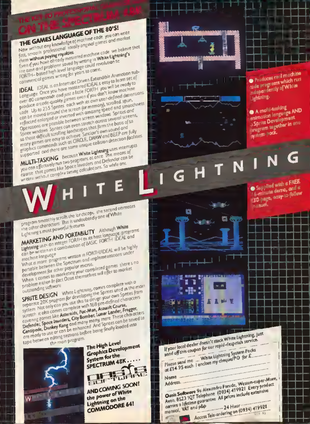
LVL are promising more packages to be used with the keyboard package and software to teach the rudiments of music

The price of £99 96 seems to me very reasonable indeed — as I've said the actual keyboard really is well made The amplifier which complements the package boosts your volume to up to six watts and, in providing a tone control, enables you to improve the sounds considerably At £49 95 it's possibly something to be bought later

The LVL keyboard is excellent for anyone who has a BBC and is interested in music — as essential a peripheral as a printer or joysticks to my mind.

I can't wait to see the Commodore 64 version which makes use of the 64's considerably better sound chip

**Graham Taylor**



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# Reviews

## Impressive

**Program** *Doodle* **Micro** CBM64 **Price** £14.95 **Supplier** Quicksilva, Palmerston Park House, 13 Palmerston Rd, Southampton, Hampshire

A number of programs have appeared recently which enable you to produce high resolution sketches on the Commodore 64. One of the latest is *Doodle* from Quicksilva, and provides a very quick and easy way of manipulating standard hi-res displays

The program has ten modes which enable you to perform all the functions required — sketching free-hand, drawing lines, circles or boxes, controlling colour, handling repeating patterns or blocks of picture, etc. The mode can be changed at any time by pressing the appropriate function key, and if you are not sure of the commands, pressing return brings up a clear and helpful screen listing all the functions of the current mode

Sketching is controlled with a joystick, and a nice feature is that you can select the speed of the cursor to suit yourself The predefined shapes are very easy to obtain, and the circle and ellipse drawing is impressively fast. Likewise the shape filling routine is very quick indeed. For detailed work, areas of the sketch can be enlarged to about eight times normal size

Naturally, your work can be saved and reloaded using tapes or disc, and some very impressive demo pictures are supplied on the disc with the program. Sketches can also be dumped out to a printer, various popular models being supported.

Altogether, this is an excellent utility It is a quick and easy way to produce hi-res pictures, and is well documented.

**Richard Corfield**

## Hazardous

**Program** *Star Avenger* **Micro** Amstrad CPC 464 **Price** £8.95 **Supplier** Kuma Computers Ltd., Unit 12, Horseshoe Park, Pangbourne, Berkshire, RG8 7JW

In *Star Avenger* you take command of a starfighter on a single handed mission to destroy the enemy HQ This is located deep inside the enemy's home planet, and heavily defended by constant barrages of accurate missiles.

First there is a hazardous flight across the surface of the planet, through a series of caverns and a narrow tunnel. At this point the missile defences are supplemented by a series of fireballs, huge bats, and fighter aircraft.

Then comes a flight across a city and into a maze where all your pilots skill will be required to negotiate the winding passages

Next comes a fortress heavily defended by accurate anti-aircraft guns, followed by a tunnel with a number of force fields along its length which need careful judgement to pass through.

The excellent graphics, sound and overall presentation of the game are slightly let down by the choice of controls, but this doesn't spoil the game

**Greg Pearson**

## Slick

**Program** *Stock Car* **Micro** Electron **Price** £6.95 **Supplier** Micro Power, 15 Sheepscar Street South, Leeds LS7 1AD

Start your engines, put the car into gear watch out for the oil slicks, take the corners with care stay out of the way of the computer controlled cars and you are off.

For the un-initiated, stock cars are either the racing to the death of old cars made to go for the one occasion or weird looking racing cars with high powered engines.

This *Stock Car* is of the high powered variety, where you can take your machine onto one of six circuits with the options of difficulty. You can race around by yourself with the computer in control of three other cars, or you can race against an opponent.

Obviously simulating the real thing on a computer is rather difficult. Apart from the rather shaky forward movement of the cars and near lack of sound use (in true stock car racing the vast amount of noise is an important part of the excitement) Micro Power have come up with a very good interpretation.

Each of the controlled cars have four gears with associated difference in speed. Steering is by left and right key operation. If you do not change to the right gear at the right part of the circuit then, as in the real thing, you smash into the fence

I found it an exciting game and a refreshing change from a lot available at present

**Fred Short**

## Animated

**Program** *Graphics Editor* **Price** £14.95 **Micro** Commodore 64 **Supplier** Romik Software, 272 Argyll Avenue, Slough SL1 4HE

There are a number of graphics utilities available for the Commodore 64, but most of them are either sprite, character or sketchpad programs. The new *Graphics Editor* from Romik Software is unusual in that it combines all of these features. When the program has loaded, you are presented with a menu giving you three options — a character editor a sprite editor, and a screen editor

The character editor provides all the facilities you need to define your own customised character sets It is easy and quick to use, and has a number of good features For example, a window is provided to display combinations of new characters.

The sprite editor is very similar in use to the character editor, and enables you to create up to 64 sprites in either standard or multi-colour modes The editing is controlled by straightforward single keystroke commands, and sensibly these are the same as in the other two editors. A facility to create animated sequences of up to 16 sprites is also provided.

The screen editor enables you to build up screen images using either the standard character set, or one of your redefined ones.

This is a well planned and nicely presented package The instructions and commands are clear and consistent.

**Richard Corfield**

# Reviews

## Seeing red

**Program** *Traffic* **Micro** CBM 64 **Price** £7.95 **Supplier** Quicksilva, Palmerston Park House, 13 Palmerston Rd, Southampton Hampshire

*Traffic* from Quicksilva is an unusual and original game. In it you are presented with an aerial view of a set of road junctions controlled by traffic lights. Your job is to maintain smooth traffic flow around the road system by changing the lights to avoid the build up of traffic jams. You score points while the traffic flows smoothly, and if you successfully cope with the first traffic scheme, you move on to a more difficult one.

Each road plan starts off with very little traffic on it, but the number of vehicles quickly builds up, and it soon becomes pretty difficult to avoid long queues developing at the lights. If the jams become too bad, your turn is ended and you have to start again from the beginning.

This is an unusual idea for a game, and it is nicely presented. The graphics are simple, but quite effective. Fuller instructions would have been very welcome though, as when queues start to build up various bleeping noises start and numbers appear on the screen — some of them flashing. The meaning of all this is not at all obvious, and it is never explained.

This game is good fun for a while, but after a few goes it starts to become as frustrating as being stuck in a real traffic jam.

**Richard Corfield**

## Up the river

**Program** *River Raid* **Price** £7.99 **Micro** Spectrum 48K **Supplier** Activision UK Inc., 15 Harley House, Marylebone Road, London NW1 5HE

Activision have a long held reputation for their video games. Now they have adapted some of these for home computers.

*River Raid* is a shoot-em-up. You fly a jet, which crashes if it flies over land — odd! Once started the river scrolls continuously while you move left or right, accelerate or decelerate, taking pot shots at anything that moves.

Your progress is marked by bridges which you blow up, amassing even more points. But all this flying eats fuel so you fly over fuel dumps to refill your tanks, and guess what — they become increasingly scarce as you proceed. And inevitably the enemy return fire later too.

All this makes for a few hours of gory fun, the graphics are serviceable, the sound almost enough to make you think of arcades. Where *River Raid* falls down is that, compared with the state of the art, it is desperately flat.

Implementation is only fair. The return to menu routine is clumsy and there is no high score table. Several joysticks are catered for though, and with one of these it should be suitable for younger players.

**John Minson**

## Zen

**Program** *Zenji* **Price** £7.99 **Micro** Spectrum 48K **Supplier** Activision UK Inc., 15 Harley House Marylebone Road, London NW1 5HE

A conversation overheard recently at the local Chinky:

"Tell me, oh Master, what is *Zenji*?"

"To quote its designer, my child, 'It is a new kind of experience whose strategy lies in sensing the right move and trusting your intuition'."

"But what is it?"

"It is Zen and the Art of the Arcade Game."

"Ahh. Arcade action."

"Not really. Though you try to beat the clock there is nothing to shoot. Instead you move a head, revolving blocks to try and create a golden path. In that instant *Zenji* occurs."

"And I score points?"

"I quote 'There is no conquest'."

"But there is a High Score table!"

"Try to enter your name though. That takes speed and skill as it is too sensitive."

"What is the winning ... sorry, most sublime strategy?"

"I quote again. 'There is no planning'."

"That must make it very random."

"Try it. You will see."

(Disciple plays *Zenji*. Thirty seconds later ... )

"And what have you learnt, little grasshopper?"

"That *Zenji* is an infuriating waste of time. Obviously I am not on a high enough spiritual plain."

(Master departs. Disciple *Loads* Space Invaders.)

**John Minson**

## Dig this

**Program** *Rubble Trouble* **Micro** Electron **Price** £6.95 **Supplier** Micro Power, 15 Sheepscar Street South, Leeds LS7 1AD

During the years 2001 to 2003 a third world war took place. The bomb went off and you were left nothing better than a caveman, to face the deadly mutant Krackets who love nothing more than human flesh.

To survive you must kill the ever increasing numbers of Krackets and being a caveman means that all you can do is push a piece of rock (which form the maze walls) onto them. Miss the Kracket and the rock bounces back and kills you. The background radiation is rising so you must hurry before the rocks disintegrate or the radiation kills you off. Green rocks give bonus points but do not attempt to move a rock containing a bomb — it may start yet another holocaust. The Krackets themselves develop from eggs, so you may be able to kill them off before they hatch.

That then is the story line. It's very topical and sounds full of doom and gloom but I was fascinated and found it full of fun. Granted it's very like *Pengo* and *Mr Wiz*, but it's obviously been compiled by someone with a super sense of humour.

Whatever you do, do not miss out on the screen option of reading the instructions and full background story to the game. It was the sheer delight to see such originality using a cinema screen credit type method of presenting the information.

Such humour in a game, especially one with a rather gloomy background story, is refreshing. A very amusing, well thought out, fun packed game.

**Fred Short**

## Nasties

**Program** *Kentilla* **Price** £6.95 **Micro** Spectrum 48K **Supplier** Micromega, 230-236 Lavender Hill, London SW11 1LE.

Long before *Codename Mat*, Derek Brewster wrote a Basic adventure called *Velnor's Lair* Now Grako has inherited Velnor's power and once again Caraland is threatened, only this time in machine code and with illustrations

*Kentilla* is actually quite sophisticated. It is populated by various wandering nasties Bide your time and kill them one by one, if you're wise. It also has a pseudo-interaction system, though unlike *The Hobbit*, saying virtually anything will get the same response

It's good to see graphics so intelligently used. Almost every location has a small but attractive illustration, and at times you'll need these to find your way

Caraland appears to provide a very concrete framework for this adventure, with its own myths and monsters. Examining is important, as is the ability to look into the next location.

There is a useful editor for entries, with recall of the previous command, most of which are two words, drawing on a largish vocabulary

In short a difficult challenge for the serious adventurer, but perhaps lacking character

**John Minson**

## Chills

**Program** *Chiller* **Micro** CBM 64 **Price** £1.99 **Supplier** Mastertronic, Park Lorne, Park Road, London NW8

Computer games based on just about everything have appeared over the last year or two, but *Chiller* must be about the first to be based on a pop video — Michael Jackson's *Thriller* in fact.

In the game you have to rescue your girlfriend who is imprisoned in a haunted house some distance away To reach her you must make your way through five screens full of hazards — the forest, the cinema, the ghetto, a graveyard and then the haunted house itself

At each stage, various ghouls, zombies bats and other nasties must be avoided as contact with any of them saps your energy If you rescue the girl from the house, the two characters must be guided back through all five screens to safety

This game is one of the Mastertronic £1.99 series, and it certainly gives the lie to those who claim that good computer games cannot be produced so cheaply. It is as good as most games at three or four times the price, and better than quite a few of them.

The basic elements are pretty standard arcade formula, but the whole game is well presented with nice graphics and sound, and it is sufficiently challenging and interesting to provide more lasting enjoyment than most games It certainly makes most £6 to £8 games look ridiculously expensive

**Richard Corfield**

## Pill popping

**Program** *Mr Robot* **Micro** CBM 64 **Price** £10.00 **Supplier** Beyond, Durrant House, Herbal Hill, London EC1

Mr Robot from Datamost fits into one of the standard arcade game styles, but does have a feature which sets it apart from other similar games

In the game itself, you have to guide Mr Robot round the robot testing course This consists of a series of platforms connected by ladders, escalators and greasy poles You must collect all the power pills on each platform before you can move onto the next screen.

So far, so standard — the game is not particularly original, but it is well presented and is quite good fun. However when you get tired of playing the standard screens, the game has the unusual feature of allowing you to design and play your own versions.

This robot factory, as it is called, is an excellent idea and is very easy to use You can select any of the features of the game you like, arrange on the screen as you wish, then play on your new screen.

One black mark though — on the cassette version, you cannot save your new screen designs.

**Richard Corfield**

## Side swipes

**Program** *Dragon World* **Price** £5.99 **Micro** Spectrum 48K **Supplier** Britannia Software Ltd, Cardiff Workshops, Lewis Road, East Moors, Cardiff CF1 5EG

Gilsoft's *Quill* guarantees competent adventures — but many are no more than that! It still takes imagination to make spending hours over a hot keyboard worthwhile

Britannia seem to have cracked it with *Dragon World* though. Some adventures are 'humorous', this one is genuinely funny too It plays with the conventions of Sword and Sorcery while taking sideswipes at other well known games.

For example, your quest is to find a Princess. Hardly original, but you find her almost immediately; dealing with her troll guard is the problem

Add to this some very witty, unexpected and often insulting responses, and you'll probably want to continue for laughs alone.

Not that the adventure itself is bad. There are lots of locations, lavishly described, proving that vivid words beat graphics for involvement every time Objects aren't too common but those that you find are interesting

This is a great start for Britannia's Micro World series, and should appeal to all but the most humourless

**John Minson**


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# Put on the map

***Philip Hickling**'s program will map your microdrive in graphic detail, on the Spectrum 48K*

This program is for use with the Spectrum with Interface 1 and Microdrive. Its purpose is to display graphically the use of each sector on a microdrive cartridge

Each cartridge is divided into sectors of 512 bytes, or ½K. Whenever a microdrive is accessed, a map of the cartridge is created in memory, in space below the program area. This map remains while the microdrive is actually in operation, or while a stream is directed to the microdrive

The map consists of 32 bytes, in which each of the 8 bits represents a sector on the cartridge. The bit is set if the corresponding sector is used, or cannot be used. In all, the map has 256 bits, so in theory up to 128k of cartridge could be accessed, although Sinclair cartridges generally have only 170-190 sectors. Because of this bits which correspond to sectors which do not physically exist on the cartridge are also set. Thus, a newly formatted cartridge will only have part of its map shown free

Use of the program provides an insight into the way in which files are saved — not in the sequential manner from the beginning to the end of the cartridge that might be expected. Also, it would seem that cartridges have a capacity of less than 100K due to shortage of tape inside the cartridge, not faults on the tape, as inferred in the manual. Evidence for this is that a newly formatted cartridge has one long block of free space, rather than a block of 100K interspersed with patches of unavailable space.

### Program notes

- Line 60 — creates a map in memory of the cartridge currently in drive 1. Since nothing is prin[ted] to the file the cartridge is [un]altered.
- Line 70 — reads the relevant part of the map into the variable c. Under normal conditions, the map of the cartridge in drive 1 resides in the 32 bytes from address 23792 onwards.
- Line 120 — effectively closes stream #4 without writing anything to the cartridge.
- Line 150 — removes the map from the screen while another cartridge is being mapped.
- Lines 170-260 — initialise the array of powers of 2, and set up graphics.
- Lines 270-360 — set up the screen.
- Lines 370-410 — wait for *Enter* to be pressed before mapping a cartridge. Also initialise the free space total for the cartridge to be mapped to zero
- Lines 420-480 — routine to convert a number into a sequence of colour control codes and spaces, equivalent to binary

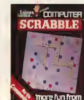
The letters A and B in line 320 are entered in graphics mode. Take care not to omit the commas in lines 180 and 390

### Variables

- Simple: c — parameter for binary conversion routine at line 470, containing one byte of map.
- e — total amount of memory available on cartridge, in K.
- Control: a — used throughout program in looping
- b — nested in main loop
- d — used in binary conversion routine, to step through powers of 2.
- String: a$ — output from binary conversion routine, consisting of eight sets of colour codes each followed by a space.
- b$ — string of spaces for blanking part of screen.
- Subscripted: a — one dimensional array of eight elements, containing the powers of 2 where a(x) = 2 ↑ (x−1).

```
   1 REM
      Microdrive Map
      Philip Hickling
      May, 1984
  10 GO SUB 170
  20 POKE 23693,40  BORDER 5   CL
S
  30 GO SUB 270
  40 OPEN #4,"m";1;"mapfile"
  50 FOR a=0 TO 7
  60 FOR b=0 TO 3
  70 LET c=PEEK (23792+a*4+b)
  80 GO SUB 420
  90 PRINT AT a*2+1,b*8; OVER 1,
a$
 100 NEXT b
 110 NEXT a
 120 CLEAR #
 130 PRINT AT 21,21;e," K"
 140 GO SUB 370
 150 PRINT AT 21,21,AT 0,0; OVER
1,b$
 160 GO TO 40
 170 DIM a(8)
 180 DIM b$(512)
 190 FOR a=0 TO 7
 200 LET a(a+1)=2↑a
 210 NEXT a
 220 FOR a=0 TO 7
 230 POKE USR "a"+a,128
 240 POKE USR "b"+a,129
 250 NEXT a
 260 RETURN
 270 FOR a=168 TO 58 STEP -16
 280 PLOT 8,a. DRAW 255,0
 290 PLOT 0,a-9  DRAW 255,0
 300 NEXT a
 310 FOR a=1 TO 16 STEP 2
 320 PRINT AT a,0,"AAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAB"
 330 NEXT a
 340 PRINT AT 19,12, PAPER 4," "
, PAPER 5," - Used"
 350 PRINT AT 20,12; PAPER 6," "
; PAPER 5," - Free"
 360 PRINT AT 21,6;"Free space -
"
 370 PRINT AT 17,0,"Insert cartr
idge and press ENTER"
 380 IF INKEY$<>CHR$ 13 THEN GO
TO 380
 390 PRINT AT 17,0,,
 400 LET e=0
 410 RETURN
 420 LET a$=""
 430 FOR d=7 TO 0 STEP -1
 440 LET a$=CHR$ 17+CHR$ (6-2*(c
>=a(d+1)))+" "+a$
 450 IF c<a(d+1) THEN LET e=e+.5
 460 LET c=c-a(d+1)*(c>=a(d+1))
 470 NEXT d
 480 RETURN
```

# Ingenious...













**Computer games for people who hate computer games.**
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# Detailed examination

*Stop Poking around in the dark and take a look at the QL Disassembler by* ***Keith Poole***

Any serious code programmer at some point will want to examine the QL's memory in detail, maybe with a view to using a Rom routine, or perhaps from idle curiosity.

This program, *QL Disassembler*, will allow you to do just that and should prove useful to any QL enthusiast. The listing itself will be printed over two weeks, with accompanying notes on the program and the 68000 chip.

**Program Notes**

The instruction set of the 68000 can be split into 13 groups depending on the top four bits of the op-code. Each of these groups defines a certain set of operations.

| | |
|---|---|
| Group 0 | Immediate and bit instructions (ADDI etc) |
| Group 1-3 | Move (1=bytes, 2=long words, 3=words) |
| Group 4 | Miscellaneous instructions |
| Group 5 | Quick, set and decrement branch instructions |
| Group 6 | Branch instructions |
| Group 7 | Moveq instruction |
| Group 8 | Arithmetic 1 (or, div and sub) |
| Group 9 | Subtract |
| Group A&F | User defined instructions |
| Group B | Arithmetic 2 (eor and cmp) |
| Group C | Arithmetic 3 (and & multiply) |
| Group D | Add |
| Group E | Shift and rotate |

**Addressing Modes**

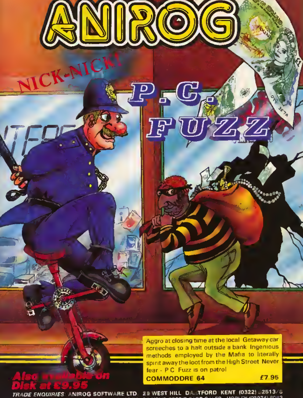
The 68000 has 12 addressing modes. These are shown in the normal motorola assembler format, except for the program counter relative mode (eg, 14A(pc)) which is followed by the effective address separated by !, ie 2068(pc)! 80C8.

This is not available for the other pc-relative mode because this depends on the contents of address or data registers which cannot be determined by the disassembler.

```
10 CLEAR
20 INK 7
40 ap1=0:DIM cc$(15,2):s=top:lgt=0
50 digit$="0123456789ABCDEF"
60 MODE 4:CSIZE 1,0:CLS £0:BORDER £0,5:CLS AT 8,15:PRINT
"Disassembler v1.0" AT
9,14 PRINT "1984 LKY Software"
70 op$="":lin=18
80 INPUT £0,"start address";a$:s=dec(a$)
90 IF s/2<>INT(s/2) THEN s=s-1
100 REPeat loop
110 top=PEEK(s) DIV 16:bot=PEEK(s) MOD
16:rest=PEEK(s+1):op=2
120 SELect ON top
130 ON top=0:group0
140 ON top=1 TO 3:group1
150 ON top=4:group4
160 ON top=5:group5
170 ON top=6:group6
180 ON top=7:group7
190 ON top=8:group8
200 ON top=9:group9
210 ON top=10,15:user
220 ON top=11:groupb
230 ON top=12:groupc
240 ON top=13:groupd
250 ON top=14:groupe
260 END SELect
270 IF lgt=1 THEN op=2:lgt=0
280 col=30:col=col-LEN(hex$(s))
290 PRINT hex$(s);" ";
300 FOR i=0 TO op-1 STEP 2
310 t$=hex$(256*PEEK(s+i)+PEEK(s+i+1)): IF LEN(t$)<
4 THEN t$=FILL$("0",4-LEN(t$))
&t$
320 PRINT t$;:col=col-LEN(t$):END FOR i
330 s=s+op
340 PRINT FILL$(" ",col);op$
350 op$="":lgt=0
360 s=stop
370 lin=lin-1:IF lin<1 THEN lin=18
380 END REPeat loop
390 DEFine FuNction dec(a$)
400 LOCal i,tot
410 tot=0
420 FOR i=1 TO LEN(a$):tot=tot*16+val(a$(i))
430 RETurn tot
440 END DEFine
450 DEFine FuNction val(a$):REMark return hex value of a$
460 LOCal t
470 t=a$ INSTR "abcdef":IF t>0 THEN RETurn t+9
480 t=a$ INSTR "ABCDEF":IF t>0 THEN RETurn t+9
490 IF a$<"0" OR a$>"9" THEN
500    RETurn 1
510  ELSE
520    RETurn a$
530 END IF
540 END DEFine
550 DEFine FuNction hex$(a)
560 LOCal str$,main,b
570 str$="":REPeat main
580 a=a/16:b=16*(a-INT(a)):a=INT(a)
590 str$=digit$(b+1)&str$
600 IF a=0 THEN EXIT main
610 END REPeat main
620 RETurn str$
630 END DEFine
640 DEFine PROCedure group0
650 IF slice(rest,3,3)=1 AND bot MOD 2=1 THEN
660    op$="movep"
670    IF slice(rest,6,1)=1 THEN
680       op$=op$&".l":lgt=1
690    ELSE
700       op$=op$&".w"
710    END IF
720    p=PEEK_W(s+op)
730    reg$="d"&(bot DIV 2):ad$=hex$(p)&
"(a"&(rest MOD 7)&")":op=op+2
740    IF rest DIV 128=1 THEN
750       op$=op$&" "&reg$&","&ad$
760    ELSE
770       op$=op$&" "&ad$&","&reg$
780    END IF
790 ELSE
800 op$=type$(slice(rest,6,2))
810 IF slice(rest,6,2)=2 THEN
820    p=PEEK_L(s+op):op$=op$&" £"&hex$(p):op=op+4
830 ELSE
840    p=PEEK_W(s+op)
850    IF slice(rest,6,2)=0 THEN p=p&&255
860    op$=op$&" £"&hex$(p):op=op+2
870 END IF
880 op$=op$&","&addr$(slice(rest,3,3),slice(rest,0,3))
890 SELect ON bot
900 ON bot=6:op$="addi"&op$
910 ON bot=2:op$="andi"&op$
920 ON bot=12:op$="cmpi"&op$
930 ON bot=10:op$="eori"&op$
940 ON bot=0:op$="ori"&op$
950 ON bot=4:op$="subi"&op$
960 ON bot=REMAINDER
970    op=2
980    xx=slice(rest,6,2)+4*(bot MOD 2)
990    SELect ON xx
1000    ON xx=5:op$="bchg":im=0
1010    ON xx=1:op$="bchg":im=1
1020    ON xx=6:op$="bclr":im=0
1030    ON xx=2:op$="bclr":im=1
1040    ON xx=7:op$="bset":im=0
1050    ON xx=3:op$="bset":im=1
1060    ON xx=4:op$="btst":im=0
1070    ON xx=0:op$="btst":im=1
1080    END SELect
1090 IF slice(rest,3,3)<>1 THEN
1100 IF im=1 THEN
1110    op$=op$&" £"&hex$(PEEK_W(s+op))&","
1120 op=op+2
1130    op$=op$&addr$(slice(rest,3,3),slice(rest,0,3))
1140 ELSE
1150    op$=op$&" d"&hex$(bot DIV 2)&","&addr$(slice
(rest,3,3),slice(rest,0,3))
1160 END IF
1170 ELSE
1180  op$=op$&" error"
1190 END IF
1200 END SELect
1210 END IF
1220 END DEFine
1230 DEFine PROCedure group1
1240 op$="move"
1250 SElect ON top
1260 ON top=1:op$=op$&".b"
1270 ON top=2:op$=op$&".l":lgt=1
1280 ON top=3:op$=op$&".w"
1290 END SELect
```

```
1700 op$=op$&"  "&addr$(slice(rest,3,3),slice(rest,0,3))&",";addr$(slice(rest,6,
3)+4*(bot MOD 2),bot DIV 2)
1710 END DEFine
1720 DEFine PROCedure group4
1730 SELect ON bot
1740   ON bot=2:op$="clr"&type$(slice(rest,6,2))&
" "&addr$(slice(rest,3,3),slice(rest,0,3))
1750   ON bot=4
1760     IF slice(rest,6,2)=3 THEN
1770       op$="move.w  "&addr$(slice(rest,3,3),slice
(rest,0,3))&",ccr"
1780     ELSE
1790       op$="neg"&type$(slice(rest,6,2))&
"&addr$(slice(rest,3,3),slice(rest,0,3))
1800     END IF
1810   ON bot=6
1820     IF slice(rest,6,2)=3 THEN
1830       op$="move.w  sr,"&addr$(slice
rest,3,3),slice(rest,0,3))
1840     ELSE
1850       op$="negx"&type$(slice(rest,3,3))&"
"&addr$(slice(rest,3,3),slice(rest,0,3))
1860   END IF
1870   ON bot=6
1880     IF slice(rest,6,2)=3 THEN
1890       op$="move.w  "&addr$(slice(rest,3,3)
,slice(rest,0,3))&",sr"
1900     ELSE
1910       op$="not"&type$(slice(rest,6,2))&"
"&addr$(slice(rest,3,3),slice(rest,0,3))
1920   END IF
1930   ON bot=8:subs8
1940   ON bot=10
1950     IF slice(rest,6,2)=3 THEN
1960       op$="tas  "&addr$(slice(rest,3,3)
,slice(rest,0,3))
1970     ELSE
1980       op$="tst"&type$(slice(rest,6,2))&"
"&addr$(slice(rest,3,3),slice(rest,0,3))
1990   END IF
1600   ON bot=14:sub14
1610   ON bot=12:movem
1620   ON bot=REMAINDER
1630     xx=slice(rest,6,2)+4*(bot MOD 2)
1640     SELect ON xx
1650       ON xx=6:op$="chk":r$="d"
1660       ON xx=7:op$="lea":r$="a"
1670       ON xx=REMAINDER :op$="error":r$="a"
1680     END SELect
1690   op$=op$&"  "&addr$(slice(rest,3,3),slice
(rest,0,3))&","&r$&(bot DIV 2)
1700 END SELect
1710 END DEFine
1720 DEFine PROCedure group5
1730 IF rest DIV 64=3 THEN
1740   IF bot=1 THEN
1750     op$="ra"
1760   ELSE
1770     op$=cc$(bot)
1780   END IF
1790   IF slice(rest,3,3)=1 THEN
1800     p=PEEK_W(s+n):n=n+2
1810     op$="db"&op$&"  d"&(rest MOD 8)&","
&hex$(s+n+4)
1820   ELSE
1830     IF op$="ra" THEN op$="st"
1840     op$="s"&op$&"  "&addr$(slice(rest,3,3)
,rest MOD 8)
1850   END IF
1860 ELSE
1870   IF bot MOD 2=1 THEN
1880     op$="subq"
1890   ELSE
1900     op$="addq"
1910   END IF
1920   p=bot DIV 2:IF p=0 THEN p=8
1930   op$=op$&"  #"&hex$(p)&","&addr$(slice(rest,3,3)
,rest MOD 8)
1940 END IF
1950 END DEFine
1960 DEFine PROCedure group6
1970 IF rest=0 THEN
1980   oper=PEEK_W(s+n):n=n+2
1990   IF oper>32767 THEN oper=-(65536-oper)
2000 ELSE
2010   oper=rest
2020   IF oper>127 THEN oper=-(256-oper)
2030 END IF
2040 op$="b"&cc$(bot)&"  "&hex$(s+n+oper+2)
2050 END DEFine
2060 DEFine PROCedure group7
2070 IF (bot MOD 2) THEN
2080   op$="error taught"
2090 ELSE
2100   op$="moveq  #"&hex$(rest)&",d"&(bot DIV 2)
2110 END IF
2120 END DEFine
2130 DEFine PROCedure group8
2140 IF slice(rest,6,2)=3 THEN
2150   IF (bot MOD 2)=1 THEN
2160     op$="divs"
2170   ELSE
2180     op$="divu"
2190   END IF
2200   op$=op$&"  d"&(bot DIV 2)&","&addr$(slice
(rest,3,3),slice(rest,0,3))
2210 ELSE
2220   IF slice(rest,3,5)=1 AND (bot MOD 2)=1 THEN
2230     op$="sbcd  d"&(rest MOD 8)&",d"&(bot DIV 2)
2240   ELSE
2250     op$="or"&type$(slice(rest,6,2))
2260     IF (bot MOD 2)=1 THEN
2270       op$=op$&"  d"&(bot DIV 2)&","&addr$(slice
(rest,3,3),slice(rest,0,3))
2280     ELSE
2290       op$=op$&"  "&addr$(slice(rest,3,3),slice
(rest,0,3))&",d"&(bot DIV 2)
2300     END IF
2310   END IF
2320 END IF
2330 END DEFine
2340 DEFine PROCedure group9
2350 IF (bot MOD 2)=1 AND slice(rest,3,3)<2 THEN
2360   op$="subx"&type$(slice(rest,6,2))&"
#"&(rest MOD 8)&",d"&(bot DIV 2)
2370 ELSE
2380   IF slice(rest,6,2)=3 THEN
2390     op$="suba."
2400     IF bot MOD 2=0 THEN
2410       op$=op$&"w  "
2420     ELSE
2430       op$=op$&"l "
2440     END IF
2450     op$=op$&addr$(slice(rest,3,3),slice
(rest,0,3))&",a"&(bot DIV 2)
2460   ELSE
2470     op$="sub"&type$(slice(rest,6,2))
2480     IF (bot MOD 2)=1 THEN
2490       IF slice(rest,3,3)=1 THEN op$="error taught"
2500       op$=op$&"  d"&(bot DIV 2)&","&addr$(slice
(rest,3,3),slice(rest,0,3))
2510     ELSE
2520       op$=op$&"  "&addr$(slice(rest,3,3),slice
(rest,0,3))&",d"&(bot DIV 2)
2530     END IF
2540   END IF
2550 END IF
2560 END DEFine
2570 DEFine PROCedure user
2580 op$="usef"
2590 END DEFine
2600 DEFine PROCedure groupb
2610 IF (rest DIV 64)=3 THEN
2620   op$="cmpa"
2630   IF bot MOD 2=1 THEN
2640     op$=op$&".l ":lgt=1
2650   ELSE
2660     op$=op$&".w "
2670   END IF
2680   op$=op$&"  "&addr$(slice(rest,3,3)
,slice(rest,0,3))&",a"&(bot DIV 2)
2690   IF type$(rest DIV 64)=".l" THEN lgt=1
2700 ELSE
2710   IF bot MOD 2=1 THEN
2720     op$="cmpm"&type$(rest DIV 64)&"
(a"&(rest MOD 8)&")+,(a"&(bot MOD 2)
2730   ELSE
2740     op$="cmp"&type$(slice(rest,6,2))&
"&addr$(slice(rest,3,3),slice(res
t,0,3))&",d"&(bot DIV 2)
2750   END IF
2760 END IF
2770 END DEFine
2780 DEFine PROCedure groupc
```

continued next week


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## Dragon

# Out, out, brief candle

*Enliven your birthday celebrations with this novel applications program for the Dragon by* ***Nicholas Smith***

There is a simple Basic program to enable the 'Family of the Eighties' to have some fun with their computer at children's birthday parties.

No doubt most families with young children will still wish to carry out the traditional ceremony involving the real birthday cake complete with flaming candles. However, the computerised version could be used as a forerunner to the main event, letting each child take a turn to blow out the flickering candles displayed on the television screen.

To run this program, the computer must be connected to a tape recorder, via the *Input from Tape* lead connected to the *Ear* socket on the recorder. A microphone must be connected to the *Mic* socket on the recorder. The *Play* and *Record* buttons on the tape recorder must be pressed down by holding down the lever inside the cassette compartment (which is normally held by the tabs on the cassette), then pressing *Play* and *Record*. When the candles flicker during the program, blow into the microphone. Do several trial runs to get the volume level on the recorder right.

The unscrupulous parent can fix the arrangements to ensure only the 'Birthday Child' can succeed in blowing out the candles by keeping the volume control of the tape recorder turned down until the turn of the honoured competitor.

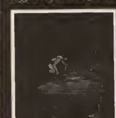
### Program Notes

**Line 10** — Enables two independent screens of graphics to be used.
**Line 20** — Sets amount of candles.
**Line 30** — Put computer into graphics.
**Lines 40 & 50** — Draws circles. The format = circle (position x, position y), radius, colour, height to width ratio, starting point, ending point.
**Lines 70 & 80** — Draws line from point specified in the first bracket to point specified in the second bracket.
**Lines 90 to 100** — Fills in cake with solid colour. The co-ordinates in the bracket specify where to start painting. The first number outside the bracket is the colour to be painted, and the second number is the colour at which painting must stop (1=green, 2=yellow 3=blue 4=red).
**Lines 110 — 120** — Draw writing. It says 'Happy Birthday'.
**Line 140** — Plays 'Happy Birthday To You'.
**Line 160** — Defines a mathematical equation.
**Lines 170 to 230** — For/Next loop which draws candles if P=0 and draws flames if P=1. P is changed at line 240.
**Line 240** — The completed screen (without flames) is copied to the second screen reserved in line 10. P is set to 1, and the loop between 170 and 240 is run again to draw flames.
**Line 250** — Return to Line 140 (Tune).
**Line 260** — The two graphic screens are flipped through in rapid succession. (Screen one has flames whilst screen two does not.) This produces the flickering flames. The part of memory concerned with audio input is peeked, and depending on the result a branch is taken to either Line 240 or 270. This could be replaced by an *Inkey$* statement if a similar effect is wanted but your tape recorder is not compatible.
**Line 270** — Screen two (without flames) is displayed to show candles blown out.

```
10 PCLEAR 8
20 Q=21
30 PMODE3,1:SCREEN1,0:PCLS1
40 CIRCLE(128,96),60,4,.3
50 CIRCLE(128,128),60,4,.3,0,.5
60 COLOR 4,1
70 LINE(68,96)-(68,128),PSET
80 LINE(188,96)-(188,128),PSET
90 PAINT(128,96),1,4
100 PAINT(128,128),2,4
110 DRAW"BM16,4;C4;D16U8R8U8D16;BM30,20;
U16R8D16U8L8;BM44,20;U16R8D8L8;BM58,20;U
16R8D8L8;BM72,4;D8R8U8D16L8;BM100,20;U16
R8D7L4D1L4R4D1R4D7L8;BM114,20,R8L4U16L4R
8;BM128,20;U16R8D8L8R2D2R2D2R2D2R2D2;BM1
42,4,R8L4D16,BM156,4;D16U8R8U8D16"
120 DRAW"BM170,20;U16R6D2R2D2R2D8L2D2L2D
2L6;BM186,20;U16R8D16U8L8;BM200,4;D8R8U8
D16L8'
130 GOSUB 160
140 PLAY'O2,T3L8CCL4DL4CFEP4L8CCL4DL4CGF
P4L8CCO3L4CO2AFEDL8B-8-L4AFGF"
150 GOTO 260
160 DEF FN R(X)=4.0*ATN(1.0)
170 FOR T=1 TO Q
180 A=T/(Q/2)*FN R(A)
190 X=128+50*COS(A)
200 Y=96+15*SIN(A)
210 IF P=0 THEN LINE(X,Y)-(X,Y-10),PSET
220 IF P=1 THEN CIRCLE(X,Y-10),5,2,1.5:C
IRCLE(X,Y-10),4,2,.25
230 NEXT T
240 IF P=1 THEN 250 ELSE IF P=0 THEN PCO
PY1 TO 5:PCOPY 2 TO 6:PCOPY 3 TO 7.PCOPY
 4 TO 8:P=1:GOTO 170
250 RETURN
260 PMODE3,1:SCREEN1,0:FOR X=1 TO 6:NEXT
:AUDIOON:PMODE3,5:SCREEN1,0:IF PEEK(6531
2)=126 THEN 260 ELSE 270
270 PMODE3,5:SCREEN1,0
280 GOTO 280
```

HAPPY BIRTHDAY









# Reading between the lines

*Compress your graphics in memory by using these routines written by **Andy Mitchell** for the BBC B*

Adventure games with graphics are here to stay. This is a fact bemoaned by traditionalists who hate picture books but welcomed by many who want novelty. Love them or hate them, as a game writer you can't ignore them.

The problem for the Beeb is that you can't use a graphic mode with its convenient drawing routines without also losing massive chunks of precious memory to the screen map. The obvious solution is the use of Teletex graphics which gives reasonable results without additional memory loss. Of course, the next problem is the loss of drawing routines which means you must place every shape and colour character yourself. Various methods may be used to achieve this and as with all programming techniques the easiest to understand is not the best!

The simplest method involves drawing the required picture on squared paper and then transferring this information into a data list which is made up of the X and Y co-ordinates used by a *Print Tab* command for each shape and colour character followed by the character number used by the *Chr$* command. In Example 1 you can see that a simple routine to read each group of three numbers in the *Data* statements and use them in the *Print Tab(X,Y) Chr$(num)* command will draw a small shape. This method, although simple, wastes a great deal of memory as each character printed requires three separate numbers stored to produce it. In addition by holding numbers in a *Data* statement we are wasting more space than if we held the numbers directly in memory.

To read the data and place it directly in memory Example 2 is used. This routine stores each of the numbers in successive memory locations beginning at location *&3000*. To retrieve the data and display it we use procedure *Procdraw*. Having stored the data in memory, *Procstore* and the *Data* statement may be discarded and only *Procdraw* and the section of memory from *&3000* to *&3011* need be saved for inclusion in our game. (The memory being saved using a **Save"picture" 3000 3011* command)

This method has saved us some space, but it is still wasteful as we are still storing three numbers for each character. One method of overcoming this is to first draw our required picture on the screen using any method we like and then save the result to elsewhere in memory where we can process it further. The simplest way of achieving this is by using one of the many commercial teletext editor packages. By using such a package you can quickly draw your picture and save it to tape from where you can reload it to anywhere in memory using a **Load* command. Without an editor to assist you, you may still draw your picture using any other method you choose as this method will not form part of the final program. To copy your completed picture from screen to memory, you may use the procedure *Procreloc* in Example 3. This simple loop does a straight copy from the screen memory (*&7C00* to *&7FE8*) to *&3000* onwards. This procedure should be used immediately following your own drawing program so as not to corrupt the screen. Alternatively you may use the *Proctape* procedure (Example 4) to copy the screen to tape. The **Opt1,0* command suppresses the tape counter display on the screen yet again to avoid corrupting your picture.

Having moved your complete picture into memory either directly or by saving to tape then reloading to *&3000* we can now examine exactly what we've got. It is useful at this point to have the use of a memory display program such as found in many Toolkit programs. This however is not essential as we can write our own small version (see Example 5). As can be seen from examination of the memory we have now stored the contents of every location of the screen. We could copy this back directly by reversing the addresses in *Procreloc* and this is the method used by most commercial programs to put up a title page to keep us amused while the main program is loading.

However, it can be seen that large quantities of the data contains many successive locations holding the same characters (eg, *&FF*, *&20* and *&00*).

We could save space easily by replacing these long lines of identical numbers by simply replacing them by one example of the character followed by the number required (eg, *FF, FF, FF, FF* becomes *FF,*

```
  1 REM EXAMPLE 2
 10MODE 7
 20 PRINT"DRAW OR STORE - D OR S ?"
 30INPUT A$
 40IF A$="D" PROCDRAW ELSE PROCSTORE
 50END
 60DEFPROCSTORE
 70 FOR Z% = 0 TO 17
 80 READ X%
 90 Z%?&3000 = X%
100 NEXT Z%
110 ENDPROC
120DEFPROCDRAW
130 CLS
140 START% = &3000
150 FOR Z% = 1 TO 6
160 X% = ?START% : Y% = START%?1
 : CHAR% = START%?2
170 PRINTTAB(X%,Y%) CHR$(CHAR%)
180 START% = START% + 3
190 NEXT Z%
200 ENDPROC
210 DATA 9,10,145,10,10,255,11,10,255
220 DATA 9,11,149,10,11,255,11,11,255
```

```
  1 REM EXAMPLE 3
 10 DEFPROCRELOC
 20 FOR I% = 1 TO 999 STEP 4
 30 I%!&3000 = I%!&7C00
 40 NEXT I%
 50 ENDPROC
```

```
  1 REM EXAMPLE 4
 10 DEFPROCTAPE
 20 *OPT1,0
 30 *SAVE"SCREEN" 7C00 7FE8
 40 ENDPROC
```

```
  1 REM EXAMPLE 5
 10 MODE 7
 20 PRINT"INPUT START ADDRESS
 IN HEX e.g. &3000'
 30 INPUT ADD$
 40 START% = EVAL( ADD$ )
 50 PRINT" INPUT NUMBER OF LOCATIONS'
 60 INPUT NUM%
 70 FOR I%= 0 TO NUM%
 80 PRINT ~ I%?START%; SPC(4);
    PRINT ~ START%+I%
 90 NEXT I%
100 END
```

04).

This processing is carried out by the *Compress* option of Example 6. By selecting *Compress* the program will begin at location *&3000* and will process 1000 bytes (which is the size of a mode 7 screen) into locations *&6000* onwards. On completion it will print the address of the final location used and state the number of bytes saved. It is this section of memory from *&6000* onwards which must be saved (ie, *"Save-"New" 6000 ????*) to be used in your final program with the *Procback* procedure in Example 6. *Procback* (Restore option) will decode the memory from *&6000* onwards tranfering the data to the screen until it builds up 1000 bytes.

Typically this method will save approximately one third of the space used by a normal screen dump but by amending Lines 70 and 290 in Example 6 to identify any other character in addition to *&FF* and *&20* which you find you use, repeatedly much greater savings can be made.

```
  1 REM EYAMPLE 6
 10 REM EXAMPLE 6
 20INOFF%=0:OUTOFF%=0:START=&3000:STORE=&6000
 30A%=0
 40PRINT"COMPRESS OR RESTORE  C OR R ?"
  INPUT A$:IF A$="R" PROCBACK:END
 50REPEAT
 60X%=START?INOFF%
 70IF X%=&FF OR X%=&20 OR X%=&00:PROCDUP
 ELSE PROCPACK
 80INOFF%=INOFF%+1
 90UNTIL INOFF%> 999
100CLS
110PRINTTAB(10,10)"FINAL LOCATION USED  =
"~STORE+OUTOFF%
120PRINT"BYTES SAVED= ";1000-OUTOFF%
130END
140DEFPROCDUP
150PROCPACK:Y%=X%:A%=INOFF%+1
160REPEAT
170X%=START?A%
180A%=A%+1
190UNTIL X%<>Y%
200X%=A%-INOFF%-1 INOFF%=A%-2
210IF X%>255 THEN A%=X%-255:X%=255:PROCPACK
 X%=Y% PROCPACK X%=A%
220PROCPACK:ENDPROC
230DEFPROCPACK:STORE?OUTOFF%=X%:
OUTOFF%=OUTOFF%+1 ENDPROC
240DEFPROCBACK
250CLS
260START%=&6000 SCREEN%=&7C00:A%=0
270REPEAT
280X%=START%?A%
290IF X%<>&FF AND X%<>&20 AND X%<>&00
PROCHAR ELSE A%=A%+1 Y%=START%?A%:FOR B%
=1TO Y% PROCHAR NEXT
300A%=A%+1
310UNTIL SCREEN%>&7FE8
320PRINTTAB(0,0)
330DEFPROCHAR ?SCREEN%=X%
 SCREEN%=SCREEN%+1 ENDPROC
```

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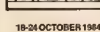
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# One interpretation

*For budding machine code programmers, a Machina Code Interpreter for the CBM 64 by* ***Dominick Devlin***

The *Machine Code Interpreter* (which is itself written in machine code) is mainly designed for programmers who are proficient in Basic and wish to start writing the whole or part of their programs in machine code. As an assembler, *Interpreter* is comparable in versatility to much longer assembly programs. It can also be used as a disassembler or monitor to inspect and edit machine code routines or character sets already inside the computer. In addition, it has other applications, such as helping to create sprites or to design screen displays.

**Creating a simple program**

Once a programmer has learnt, from the more sophisticated manuals, how machine code works, there is very little more he has to know about the *Interpreter*, because (unlike normal assemblers) it follows as closely as possible the rules of Basic. Nothing at all has to be learnt about editing, listing about editing, listing, recording and printing out machine code instructions as those instructions will be written as part of a Basic program. Inside that program, just before machine code begins, there will be a Basic command (*SYS 36460*)) which will call the *Interpreter* to take over until the program returns to Basic.

Here is a simple program, for printing out the alphabet. The machine code instructions are in Lines 10 to 60. Below the program is its rough equivalent in Basic. Of course, before the program is written the *Interpreter* routine must be loaded. Run the *Interpreter* program listed at the end of the article.

```
1  FOR CALL=1 TO 2:SYS36450:C000
10 $0000 ,ALPHABET PRINTER
20 $0000 A2 "A"
30 $0000 8A:20 D2 FF
40 $0000 E8
50 $0000 C9 "Z" D0 (30)
60 $0000 60:END
100 NEXT CALL
110 LIST
```

```
10 REM ALPHABET PRINTER
20 A$="A
30 PRINT A$
40 A$=CHR$(ASC(A$)+1)
50 IF A$<>"Z" THEN 30
60 END
```

**Line 1** The instruction *SYS 36460* calls the *Interpreter*. The *FOR/NEXT* instruction at the beginning of the line and in Line 100 makes the machine go through the routine twice (not always necessary but safer).

The *SYS* instruction must be immediately followed by the starting address of the machine code routine: the Interpreter does not itself execute machine code instructions, but stores them in the locations indicated by the Programmer. *C000*, at the end of Line 1, tells the Interpreter to put the machine code in the sequence of locations beginning at *$C000* in hexadecimal numbering *49152* in decimals. The command *SYS 49152* will execute the instructions.

**Line 10** Each new line of machine code instructions must start with a four-digit hex number — any number; the Interpreter needs the space on the line mainly for its own purposes. The semicolon is the symbol for a rem statement.

**Line 20** This means load the *X* register of the microprocessor (*A2*) with the ASC value of *"A"*. *A2* is the hexadecimal code for the instruction *LDX*. In order to keep it short, I have not taught the *Interpreter* to understand source code (*LDX, STA* etc).

The *Interpreter* treats inverted commas in the same way as *Basic* does. It takes the ASC values of all characters following them until it meets other inverted commas or the end of a line. But if after the first inverted commas it finds the symbol #, it takes the screen values (e.g., A = 1) and not the ASC values (A=65). This facility works with all screen characters except reverse characters, the letter π, and the symbol # itself.

**Line 30** copies the *X* register on to the Accumulator (*8A*) which is then sent off to the CBM 64's *CHROUT* subroutine for printing out (*20 D2 FF*). These two instructions have been put on the same line and separated by a colon for convenience only; the *Interpreter* ignores colons and spaces (outside inverted commas).

**Line 40** increases the *X* register by one.

**Line 50** compares the Accumulator (*C9*) with "*Z*"; if it is not equal (*D0*), Processing goes back to Line 30. The line number in brackets can be used with any instruction (e.g. *4C (30)* = jump to Line 30). Using line numbers is not mandatory but makes life much easier when you come to edit or debug a program, or to transfer it from one set of locations to another.

**Line 60** The code *60* is the instruction for a return from a machine code routine or subroutine. *END* marks the end of all instructions in machine code. From that point the *Basic* interpreter takes over again.

Run the program, and this is what will appear:

```
1  FOR CALL=1 TO 2:SYS36450:C000
10 $00C0 ,ALPHABET PRINTER
20 $00C0 A2 "A"
30 $02C0 8A:20 D2 FF
40 $00C0 E8
50 $07C0 C9 "Z":D0 (30)
60 $08C0 60:END
100 NEXT CALL
110 LIST
```

```
1 REM MESSAGE
2 GOSUB100 GOSUB100 LIST
3 $FBFC POINTERS TO SCREEN (0400) & COLOUR (D800) MEMORIES
4 $FDFE POINTERS TO MESSAGE (IN LINES 300 AND 310)
100 SYS36450 C000
110 $00C0  18 A0 07           ,CLC LDY #07
120 $03C0  , ....... PREPARE POINTERS
130 $03C0  A2 03              ,LDX #03
150 $05C0  B9 (320) 95 (3 L),LDA $C06#,Y STA $F8,X
160 $0AC0  88 CA 10 (150)     ,DEY DEX BPL $C005
180 $0EC0  , ....... SWITCH SCREEN WITH MESSAGE
200 $0EC0  A0 22              ,LDY ##22
210 $10C0  B1 (4 L) 48        ,LDA ($FD),Y PHA
220 $13C0  B1 (3 L) 91 (4 L),LDA ($F8),Y STA ($FD),Y
230 $17C0  68 91 (3 L)        ,PLA STA ($F8).Y
240 $1AC0  88 10 (210)        .DEY BPL $C010
250 $1DC0  ; ....... IF CARRY CLEAR, REPEAT
260 $1DC0  90 01 60           ,BCC 01 RTS
270 $20C0  38 A0 03 B0 (120),SEC LDY #03 BCS $C003
300 $25C0  "$####THIS IS YOUR LAST CHANCE!####",TEXT
310 $48C0  "#000$NNNNNNNNNNNNNAAAAAAAAAAAAAA00$00",COLOURS
320 $6BC0  00 04 (300) 00 D8 (310),I.E. 00 04 25 C0 00 D8 48 C0
330 $73C0  END RETURN
```

You will see that the address of the next location to be filled has been marked at the beginning of each line $00C0, instead of $C000, may seem rather odd, but the *Interpreter* prefers to see the addresses in that order and it will be referring to them much more than the programmer.

You now have a machine code routine stored in locations *$C000* to *C00B*. Type *SYS 49152 Return*, and it will be executed.

**Other applications**

Basically, the *Interpreter* pokes data — in the form of hex codes, CHR$ characters or screen characters — into a sequence of locations whose starting address is specified by the user. If, instead of *C000* (see Line 1 above), you choose *0340* (*832* in decimals) as your starting point, you will be directly storing the data for Sprite 13.

```
1  SYS 36450:0340 ;sprite 13
10 $0000 000000 line 1
20 $0000 1FFFFs line 2
—
210 $0000 000000 last line
220 $0000 END
```

Sprite data can be written quite easily in hexadecimals: the first and last lines of the sprite just programmed are completely blank. A program can contain several different versions of the same sprite, using only one sprite location.

With the *Interpreter*, characters can be directly poked into screen memory (starting at *$0400*), and their colours into colour memory (starting at *$d800*).

```
1000 SYS 36450:0400 ;characters
1010 $0000 "#+-" END
2000 SYS 36450:d800 ;colours
2010 $0000 "#@A" END
```

This program will put a black plus and a white minus at the top left corner of the screen. to programme the colours, Line 1010 was entered, then its number was increased by a thousand, and @ was placed on top of +, and *A* on −. The screen code for @ is 0, which is also the colour code for black, A = 1 = white, etc. To fill the whole screen, to program the colours, Line each, followed by 25 lines of corresponding colour codes.

**Advanced programming**

For programmers who are familiar with the 6510 machine code, more needs to be said about the indirect references to line numbers. As an illustration, *Message* is a program that creates a routine which, when called once, displays a message on the screen, when called again, it redisplays what was on the screen before, underneath the message.

When it finds a number in brackets, the *Interpreter* goes to the line indicated and takes the two bytes in its address: low order, high order. In Line 150, *B9 (320)* becomes *B9 6B C0* but *95 (3 L)* becomes *95 FB* — in other words, only the low order byte in the Line three address has been taken. With *95 (3 H)* the high order byte only *(FC)* would have been taken.

Lines three and four have been placed outside the machine code part of the program so that their addresses remain unchanged. Not only can the routine be placed anywhere just by altering the address in Line 100, but different pointers can be used simply by changing the addresses in Lines three and four.

An error (undetected) by the *Interpreter*) will occur if a branch instruction exceeds the permitted limit (127 bytes). There is a slight risk in using line numbers without any opcode before them, as in Line 320. If, for example, they had been preceded by *D0* the *Interpreter* would have treated them as branch instructions.

If you received an error message like *"syntax error in Line 240"*, the error might not be in that line, but in *Line* 210, to which Line 240 refers.

Note that *End* has been placed on a separate line (330), it would have been ignored in Line 320 because of the *Rem* statement there.

**Disassembly**

If you want to inspect the contents of any byte in your program, replace the corresponding code with *Q*, and run the program again. If you wish to incorporate, in your own program, routines that are already in the machine, put a *Q* for each byte to be incorporated. Normally, the *Interpreter* takes each code, translates it (if necessary) and stores it in the next location. When it meets *Q*, it does the opposite: it takes the byte in the next location, translates it into hex and puts it inside the user's program on top of the *Q*. For example, in order to reshape the alphabet program on to one line write:

```
10 SYS36450:C000 Q Q Q Q Q Q Q Q Q Q Q END:LIST
```

After *RUN*, this will be the listing:

```
10 SYS36450:C000 A2 41 8A 20 D2 FF E8 C9 5A D0 F7 60 END:LIST
```

If for example, you wish to edit a whole character set, you will need an awful number of lines with *Q*s in them. You could generate the lines by means of a program which might include the following line to fill the keyboard buffer (starting address: *$0277*):

```
SYS 36450:0277 "[home]" 0D 0D "RUN" 0D END:POKE 198,7
```

```
10 REM *** INTERPRETER ***
20 FOR P=36450 TO 36859
30 READ D:POKE P,D:NEXT:END
160 DATA 162, 2, 32, 56, 143, 144, 1, 96, 149, 252
170 DATA 202, 208, 245, 32, 56, 143, 176, 6, 32, 96
180 DATA 143, 76, 111, 142, 206, 30, 160, 4, 162, 2
190 DATA 177, 122, 149, 56, 136, 202, 208, 246, 162, 126
200 DATA 160, 5, 181, 127, 32, 113, 143, 232, 16, 248
210 DATA 32, 139, 143, 76, 111, 142, 201, 48, 240, 83
220 DATA 201, 59, 24, 240, 11, 201, 128, 208, 3, 76
230 DATA 115, 0, 201, 34, 208, 47, 160, 0, 132, 96
240 DATA 200, 177, 122, 208, 6, 32, 139, 143, 76, 124
250 DATA 142, 144, 243, 201, 34, 240, 209, 201, 35, 208
260 DATA 4, 198, 96, 208, 231, 36, 96, 240, 7, 9
270 DATA 64, 56, 233, 64, 48, 251, 32, 98, 143, 56
280 DATA 76, 178, 142, 201, 81, 240, 1, 96, 158, 255
290 DATA 162, 0, 161, 253, 32, 113, 143, 32, 102, 143
300 DATA 76, 140, 142, 32, 150, 143, 165, 123, 72, 165
310 DATA 122, 72, 165, 251, 133, 122, 165, 252, 133, 123
320 DATA 169, 4, 32, 140, 143, 32, 56, 143, 176, 62
330 DATA 166, 95, 224, 16, 208, 11, 229, 253, 56, 233
340 DATA 1, 32, 98, 143, 76, 47, 143, 166, 92, 224
350 DATA 30, 206, 5, 32, 56, 143, 176, 54, 32, 98
360 DATA 143, 230, 92, 240, 244, 104, 133, 122, 104, 133
370 DATA 123, 76, 111, 142, 32, 74, 143, 10, 10, 10
380 DATA 10, 133, 96, 32, 74, 143, 41, 15, 24, 101
390 DATA 96, 96, 32, 115, 0, 160, 144, 17, 233, 55
400 DATA 201, 4, 240, 6, 201, 9, 144, 248, 201, 16
410 DATA 144, 3, 104, 104, 152, 96, 162, 0, 129, 253
420 DATA 230, 253, 208, 2, 230, 254, 41, 31, 133, 95
430 DATA 96, 56, 32, 117, 143, 72, 144, 4, 74, 74
440 DATA 74, 74, 41, 15, 201, 10, 144, 2, 105, 6
450 DATA 105, 48, 208, 145, 122, 104, 96, 152, 24, 101
460 DATA 122, 133, 122, 144, 2, 230, 123, 96, 162, 2
470 DATA 181, 42, 149, 250, 202, 208, 249, 134, 93, 134
480 DATA 94, 32, 115, 0, 176, 43, 41, 15, 72, 24
490 DATA 38, 93, 38, 94, 165, 93, 166, 94, 38, 93
500 DATA 38, 94, 38, 93, 38, 94, 24, 101, 93, 133
510 DATA 93, 138, 101, 94, 133, 94, 104, 24, 101, 93
520 DATA 133, 93, 144, 2, 230, 94, 76, 163, 143, 233
530 DATA 42, 133, 92, 48, 3, 32, 115, 0, 162, 2
540 DATA 160, 3, 177, 251, 213, 92, 208, 5, 136, 202
550 DATA 208, 246  96, 160, 0, 177, 251, 170, 200, 177
560 DATA 251, 133, 252, 134, 251, 208, 227, 104, 104, 96
```



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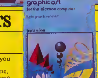








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| ☐ Spectrum Sports Hero 48K | £6.95 |
| ☐ Spectrum Mugsy 48K | £6.95 |
| ☐ Spectrum Penetrator 48K | £6.95 |
| ☐ Spectrum The Hobbit 48K | £14.95 |
| ☐ H U R G 48K | £14.95 |
| ☐ Spectrum Classic Adventure 48K | £6.95 |
| ☐ Melbourne Draw 48K | £8.95 |
| ☐ Abersoft FORTH 48K | £14.95 |

**COMMODORE 64 SOFTWARE**

| | |
|---|---|
| ☐ Castle of Terror | £9.95 |
| ☐ Commodore 64 The Hobbit | £14.95 |
| ☐ Zim Sala Bim | £9.95 |
| ☐ Commodore 64 Classic Adventure | £6.95 |
| ☐ Commodore 64 Hungry Horace | £5.95 |
| ☐ Commodore 64 Horace Goes Skiing | £5.95 |
| ☐ A.C.O.S. + | £8.95 |

**BBC SOFTWARE**

| | |
|---|---|
| ☐ BBC The Hobbit, Model B | £14.95 |
| ☐ BBC/Electron Classic Adventure | £6.95 |

All versions of 'The Hobbit' are identical with regard to the adventure program. Due to memory limitations, BBC cassette version does not include graphics.

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# Open Forum

**_Open Forum_ is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed.**

## Shopping List

on Vic20

**Shopping List**

*Shopping List* is a one line utility for the person who doesn't want to have to rush around with tatty bits of paper. However, they must own a Vic20 and a Printer. The program can take up to 20 items, although this can be increased by changing the appropriate '20's. To type in the program, use the shorthand as described in the back of the Vic manual.

**Program Notes**

Line 1 The works.

```
ITEM NO. 1 APPLES
ITEM NO. 2 SPADE
ITEM NO. 3 CAT
ITEM NO. 4 ;HUHUF,
ITEM NO. 5 DOLLY MIXTURE
ITEM NO. 6 TOILET ROLLS
ITEM NO. 7 THREE PIECE SUITE
ITEM NO. 8 TURKEY
ITEM NO. 9 COMPUTER
ITEM NO. 10 VIDEO RECORDER
ITEM NO. 11 MONOFOLK
ITEM NO. 12 TRUMPET
ITEM NO. 13 POPULAR COMPUTING WEEKLY
ITEM NO. 14 MOWER CONCORDE OF FLYING?
ITEM NO. 15 JOYSTICK
ITEM NO. 16 84.5P STAMP
ITEM NO. 17 THE OMEGA RUN
ITEM NO. 18 ASPIRINS
ITEM NO. 19 ? OPIC (GET THE JOKE)?
ITEM NO. 20 WAR & PEACE

                SHOPPING   LIST

1 DIMA$(20) FORT=1TO20 INPUTA$(T) NEXT OPEN1,4 FORT=1TO20 PRINT#1 "ITEM NO."T,A$
(T) NEXT CLOSE1
```

**Shopping List**
*by M Valentine*

# Microradio

**GW6JJN**

## Terminal kit

As promised last week, I will tell you how to come by a reasonably cheap Radio Teletype (RTTY) interface/terminal unit.

For Spectrum owners, a project is available from the Sinclair Amateur Radio Users Group (SARUG). It consists of a printed circuit board and extensive instructions regarding the construction of the unit. Also available from SARUG is the computer program needed to drive the unit. This project is about the least expensive around and I am in the process of making it myself. In fact it is just about complete and all that remains is to test it on air. SARUG can be contacted by sending a stamped addressed envelope to SARUG, 3 Red House Lane, Leiston, Suffolk.

For any other kind of computer as well as Sinclair, there is good news from the component suppliers Maplin of PO Box 3, Rayleigh, Essex SS6 8LR.

Maplin have just announced the kit for their TU1000 terminal unit designed specifically for RTTY on home computers. The kit of parts is available from them priced £49.95. It consists of all the components needed to build the unit, the only extras required being a box to put it in and the 13amp plug. These items are available from Maplin, as are many other kits and components, including their Modem for those of you who prefer to pay telephone bills.

The TU1000 is capable of several different selectable baud rates which will enable data to be received from either amateur or commercial sources. Input to the unit from the computer is via an RS232 type port so will appeal to many computer owners who have this facility.

In their published information about the unit, Maplin have provided a program based on the Atari computer but supply plenty of details on adapting it to any computer.

Interestingly, they mention something of the history of RTTY and the fact that it dates back to the beginning of the 20th century to Donald Murray who modified the original five unit code system invented by Emile Baudot in 1874. They mention also that the earliest recorded use of RTTY was in the Russian-Japanese war as far back as 1904. Scrambling methods were used by military and commercial authorities in those days as well as now. Even with your home computer rigged up to the radio you won't be able to understand sensitive information because it will be scrambled or encoded. Have no fear, though, there is plenty of data around in plain language, and most of it is in English which is now considered the international communications language.

What is significant about a large company like Maplin marketing a terminal unit kit, is that it acknowledges the growing amount of people who want to do something more with their computer than play games. RTTY is certainly the cheapest way to do this and to really interface yourself into the wide world.

**Ray Berry**

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Berry, Microradio, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD

# Open Forum

## Circle

### on Amstrad

The Amstrad, though having some very nice graphics commands, lacks a *Circle* command. These general subroutines provide such a facility in a flexible manner.

The first routine draws a circle in outline and the second a solid circle. The routines work by using the familiar parametric equation of a circle. This however gives an ellipse due to the CRT in the monitor. The vertical co-ords have been adjusted to give a circle in these routines.

An attempt has also been made to speed them up by only calculating the sines and cosines of 0-90 degrees and making use of the symmetry of the circle.

The parameters to be set before calling the routines are:

radius: radius of circle

cx,cy: x and y co-ords of circle

usepen: pen to be used

```
20 MODE 1
30 LOCATE 10,1 PRINT CHR$(24),
"SUBROUTINE DEMO",CHR$(24)
40 PRINT INPUT "Radius ",radius
50 PRINT INPUT "X,Y co-ordinates
of centre  ",cx,cy
60 PRINT INPUT"Outline or
solid (o/s)  ",type$
62 PRINT INPUT"Pen to be used ",usepen
65 CLS
70 IF type$="s" THEN GOSUB 1500
ELSE GOSUB 1000
72 LOCATE 1,1 PRINT"Press any key".
75 IF INKEY$="" THEN GOTO 75
80 RUN
900 END
999 REM ****************************
1000 REM circle
1005 REM ****************************
1010 DEG
1015 anglestep=1/INT((radius+100)/100)
1020 FOR i=0 TO 90 STEP anglestep
1030 xdis=radius*SIN(i) ydis=7*radi
us*COS(i)/8
1040 PLOT cx+xdis,cy+ydis,usepen
1050 PLOT cx-xdis,cy-ydis,usepen
1060 PLOT cx-xdis,cy+ydis,usepen
1070 PLOT cx+xdis,cy-ydis,usepen
1080 NEXT i
1090 RETURN
1490 REM ****************************
1500 REM fill circle
1505 REM ****************************
1510 DEG
1515 anglestep=1/INT((radius+100)/100)
1520 FOR i=0 TO 90 STEP anglestep
1530 xdis=radius*SIN(i)
ydis=7*radius*COS(i)/8
1540 PLOT cx+xdis,cy+ydis,usepen
1550 DRAWR -(xdis*2),0 usepen
1560 PLOT cx-xdis,cy-ydis,usepen
1570 DRAWR xdis*2,0,usepen
1580 NEXT i
1590 RETURN
```

**Circle**
*by S Sing*

# Arcade Avenue

## Hackers treat

*Jet Set Willy* is still riding high in the Spectrum charts despite stiff competition. However, from the letters that I get, I'm beginning to think that no-one is buying it to play anymore, you all just want to hack the code around. First of all, this week, I would like to thank Paul Denman of Bradford, Graeme Carrot of Newcastle and James Meeman of Enfield for your *Pokes* and programs. Unfortunately most of these have been published before, perhaps since you posted your letters. However, there have also been a few requests for me to reprint all the various JSW pokes and listings we have had. In a few weeks time I may well sit down and collect together all the various bits and pieces and publish them as the definitive word on the subject. So you may yet see your work in print.

One idea that I will consider is the "official PCW Jet Set Willy pokes" as a standard that we will encourage people to use before playing the game.

In the meantime, I have a treat for all you hackers who really want to get to work pulling the program to pieces, in the form of a long letter from Ben Caunce of Hixon, near Stafford. "Having played JSW for many weeks I think I can safely say that it is the most enjoyable game that I and my children have ever played on the Spectrum. Although I have never written a machine code program in my life I decided to 'have a go' and discover what made the game tick. The result of this madness was several weeks of late or sleepless nights and dreams containing nothing but Z80 mnemonics.

"By studying the dissembled listing of the code I discovered how, and where, the information for each room is coded. Each room is contained in only 256 bytes, the first 128 of which relate to the room's appearance. Each room consists of 16 lines by 32 columns and each byte of information in the first 128 bytes represents an area of screen 1 line high by 4 columns wide — starting from the top left. During the game the information for the room you are in is transferred to a location starting at 8000 hex and ending at 80FF (ie, 256 bytes).

"For each room the information for which rooms can be reached from it are stored in locations xxE9 (room to left), xxEA (room to right), xxEB (room upwards), and xxEC (room downwards). When Willy leaves a room to enter another the number stored in the relevant byte (xxE9-xxEC) is OR'ed (added) to C0 to give the high order address of the room information for the new room. (For example, the number stored at location C0E9, to the left of the Off Licence, is 01. Added to C0 this gives C1. C100 is the start address of the room information for T[...] Bridge). Also the informati[...] stored in locations xxF0 [...] xxFF for each room appear[...] relate to the monsters a[...] ropes since if these bytes a[...]re poked with 0 then the monst[...]ers disappear!"

This information should be particularly useful since [it] gives you the option of selec[ti]vely removing from a room a[ny] monster that you find partic[u]larly difficult.

Finally for this week I wo[uld] like to finish with a bit of [...] from Charlie Broker [of] Brigfewell in Oxon who gi[ves] us *Poke* 38488 0 which m[akes] Willy walk backwar[ds] 'sdrawcab' as he calls it.

**Tony Kendle**

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments from playing tips on difficult games or programs you'd particularly like to praise (or blame!) then write to Tony Kendle, Arcade Avenue, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 3LD

## Typing practice

on Vic 20

This utility enables the user to see how good his/her typing is It is also good exercise th using TI$

The program asks you for a sentence which you are to type On pressing Return, the clock starts, and you must type in the given sentence in as short a time as possible The computer tells you if you

You are then given the opportunity to change the sentence. Useful for budding touch-typists on the unexpanded Vic20

```
5 POKE36879 59
10 INPUT"WHAT SENTENCE?",S$
20 TI$="000000" PRINT"♥"
30 INPUTT$
40 IFT$<>S$THEN90
50 PRINT"WELL DONE! YOU DID IT IN "
60 PRINTTI/100,"SECONDS"
70 GOTO100
90 PRINT"WRONG"
100 PRINT"SAME SENTENCE(Y/N)
110 GETA$ IF A$=""THEN110
120 IFA$="Y"THEN20
130 GOTO10

READY.
```

**Typing practice**
*by H Dunn*

## The Music Box

Which of the following statements is the truest — a) computer music is a lot of tuneless plinks and bangs or b) computer music is too expensive for me?

The answer is neither is still the case So now is a good time to begin a new weekly micro music column — *The Music Box*.

Those of you who dismissed the test with an unmannerly interjection are probably already know a thing or two about the subject — if you want to be kept up to date, you could do worse than read on.

Computer music — like robotics, AI and adventure gaming — is one of the current growth areas for the home computer owner

We're not talking about sound effects for games, nor about spending thousands of pounds on your own home studio And while we may still be some way from the day when pop groups will tote micros like they used to tote guitars, that day is really not too far off. The field is developing so quickly that the first hit record produced entirely on a home micro will no doubt be with us before long

Already, lucky Commodore 64 owners can buy a floppy-disc-full of popular melodies, giving 40 minutes of baroque music, out-of-copyright American popular songs or Christmas carols when used with a piece of software called *Synthy-64* (produced by Abacus Software of Grand Rapids, Michigan and available over here from Adamsoft, 18 Norwich Avenue, Rochdale Lancs OL11 5JZ) Programs that play music or help you compose it are becoming widely available

And anyone who's been lucky enough to get their hands on Yamaha's new MSX machine — the CX5M — will know that the musical potential of the micro has, as yet, barely been tapped.

Computers and music have had a long and fruitful relationship, going back at least as far as the late forties and pioneering work at the RCA and Bell Telephone labs in the US Latterly, the names of Babbitt, Cage and Stockhausen have been joined by the likes of Thomas Dolby, Brian Eno and even Kate Bush

The micro can be used in a variety of ways to produce music — for example, through direct synthesis, the use of programmable sound generators or through the synthesiser manufacturer's standard interface — the Musical Instrument Digital Interface (MIDI) standard — which allows you to control together synths drum machines and the like

We'll be dealing with these things in future weeks as well as bringing you news, views and suggestions for micro music making If you've got any tips, news, problems or products, please write to me at *Popular Computing Weekly* and I'll make sure this column works for you.

**Gary Herman**

**The Music Box** is a new weekly column with news, reviews and readers comments on all aspects of micros and music.

Any readers with experience of computer music making or companies with new product news are invited to write to drop a line explaining what they're doing to: Gary Herman, The Music Box, 12-13 Little Newport Street London WC2R 3LD

## Function

### on Spectrum

This program (written for 48K Spectrum) will draw the graph of a mathematical function y=f(x) on a calibrated set of axes on screen, which can then be output to a ZX Printer.

It can draw the graph of any function that can be written in Spectrum Basic, and there is no limit to which part of the x,y axes the graph is drawn over.

Here are some interesting functions to try:

y=(1−x)/(1+x*x)
y=(3)/(1−x*x)
y=(3(x*x))−7
y=((x*x)*(4+x))/(2−x)

```
   1 REM ************************
   2 REM *   PROGRAM TO DRAW    *
   3 REM *   THE GRAPH OF A     *
   4 REM *    MATHEMATICAL      *
   5 REM *   FUNCTION y=f(x)    *
   6 REM ************************
   7 REM
   8 REM © Michael Poyner 1983
   9 REM
  10 INK 0: PAPER 7: BORDER 7
  12 OVER 0: FLASH 0: CLS
  14 LET a$=""
  20 PRINT AT 10,0;"Do you want to see the "
  25 PRINT "instructions on how to use"
  30 PRINT "this program ?"
  35 INPUT "Enter <y>es or <n>o ";a$
  40 IF a$="" THEN GO TO 35
  45 IF a$(1)="y" THEN GO SUB 2000: GO TO 100
  50 IF a$(1)="n" THEN GO TO 100
  55 GO TO 35
 100 INPUT "Lower limit for x-axis ",x1
 105 INPUT "Upper limit for x-axis ",x2
 110 IF x1<x2 THEN GO TO 140
 120 PRINT AT 10,0; FLASH 1;"LOWEST FIRST PLEASE"
 125 BEEP .8,0: PAUSE 100
 130 FLASH 0: CLS : GO TO 100
 140 IF a$="x" THEN GO TO 200
 150 INPUT "Lower limit for y-axis ",y1
 155 INPUT "Upper limit for y-axis ",y2
 160 IF y1<y2 THEN GO TO 200
 165 PRINT AT 10,0; FLASH 1;"LOWEST FIRST PLEASE"
 170 BEEP .8,0: PAUSE 100
 175 FLASH 0: CLS : GO TO 150
 180 REM
 190 REM * work out the ratio   *
 191 REM * between pixels and   *
 192 REM * units on axes        *
 193 REM
 200 LET rx=(x2-x1)/255
 205 IF a$="x" THEN GO TO 215
 210 LET ry=(y2-y1)/175
 213 REM
 214 REM * draw axes *
 215 GO SUB 1000
 217 REM
 220 REM * draw the function  **
 222 REM
 224 OVER 0
 225 FOR x=x1 TO x2 STEP rx
 300 LET y=SIN x
 310 LET xc=(x-x1)/rx
 315 LET yc=(y-y1)/ry
 320 IF xc<0 OR xc>255 OR yc<0 OR yc>175 THEN GO TO 330
 325 PLOT xc,yc
 330 NEXT x
 335 INPUT "Do you want a hard COPY ",a$
 337 IF a$="" THEN GO TO 335
 340 IF a$(1)="y" THEN COPY : GO TO 350
 345 IF a$(1)<>"n" THEN GO TO 335
 350 INPUT "do you want to re-draw the graph ",a$
 355 IF a$="" THEN GO TO 350
 360 IF a$(1)="n" THEN GO TO 900
 365 IF a$(1)="y" THEN GO TO 405
 370 GO TO 350
 405 PRINT AT 10,0;"Do you want to change either"
 410 PRINT "limits of x or y axes"
 415 PRINT "Enter "
 420 PRINT "<x> , <y> , <b>oth , <n>either"
 425 INPUT "x,y,b or n ",a$
 430 IF a$="" THEN GO TO 425
 435 IF a$(1)="x" OR a$(1)="b" THEN GO TO 100
 440 IF a$(1)="y" THEN GO TO 150
 445 IF a$="n" THEN GO TO 215
 450 GO TO 420
 900 STOP
 995 REM
 996 REM ************************
 997 REM * subroutine to draw   *
 998 REM * axes for graph       *
 999 REM
1000 CLS
1002 OVER 1
1003 IF y1>0 OR y2<0 THEN GO TO 1050
1005 PLOT 0,-y1/ry
1010 DRAW 255,0
1015 IF x2-x1>100 THEN GO TO 1048
1017 LET y=-y1/ry
1020 FOR i=(1/rx)*(ABS (x1)-(INT (ABS (x1)))) TO 255 STEP 1/rx
1025 PLOT i,y
1030 NEXT i
1050 IF x1>0 OR x2<0 THEN GO TO 1100
1055 PLOT -x1/rx,0
1060 DRAW 0,175
1062 IF y2-y1>80 THEN GO TO 1100
1065 LET x=-x1/rx
1070 FOR i=(1/ry)*(ABS (y1)-(INT (ABS (y1)))) TO 175 STEP 1/ry
1075 PLOT x,i
1080 NEXT i
1100 RETURN
1995 REM
1996 REM ************************
1997 REM * subroutine to print  *
1998 REM * out instructions     *
1999 REM ************************
2000 CLS
2005 PRINT TAB (8);"INSTRUCTIONS"
2010 PRINT TAB (8);"------------"
2015 PRINT
2020 PRINT TAB (5);"To set a function,"
2025 PRINT TAB (5);"rewrite line 300"
2030 PRINT "   In the form     y=f(x)"
2035 PRINT : PRINT " e.g.   300 LET y=(x*x*x)-5*x"
2040 PRINT : PRINT " Type RUN and hit <ENTER>"
2045 PRINT " Then enter the limits on"
2050 PRINT " x and y axes when asked."
2055 PRINT : PRINT "Manipulating these figures,"
2060 PRINT "you can zoom in on a new part"
2065 PRINT "of the graph."
2070 PRINT AT 21,12;"...press any key..."
2075 PAUSE 10: PAUSE 0
2080 CLS : PRINT
2085 PRINT "The computer will then draw"
2090 PRINT "the function. You can then get"
2095 PRINT "a COPY of the graph sent to a"
2100 PRINT "Sinclair ZX Printer by entering"
2105 PRINT " <y>es when asked."
2112 PRINT : PRINT "You can opt to redraw the graph"
2115 PRINT "(with different limits on axes)."
2120 PRINT : PRINT " BUT NOW ... if you want to"
2125 PRINT "put in another function,"
2130 PRINT "press <SHIFT SPACE> to BREAK,"
2132 PRINT "rewrite line 300 and run again."
2135 PRINT : PRINT
2140 PRINT "Otherwise ... to input the "
2145 PRINT "limits on axes..."
2150 PRINT AT 21,12;"...press any key..."
2155 PAUSE 10: PAUSE 0
2200 RETURN
```

**Function**
*by Michael Poyner*

# Open Forum

## Scroll protect

### on Dragon

Here is a useful routine for the Dragon owner. By interupting the Dragon's *Print* routine before the screen is scrolled it is possible to protect upto eight lines. As presented the program is set up to protect four lines. When the screen is scrolled the top four lines will remain on screen and only the bottom 12 lines will be scrolled. The number of lines protected can be altered by *Pokeing* the desired number to address &H7FD2. This routine might prove useful when writing adventure games or similar to prevent the room description from scrolling off the screen.

The routine can be entered using an assembler or *Poked* into memory using the memory dump. If the latter course is taken then also *Poke*360,&H7F, *Poke*361 &HBD. *Poke*359,&H7E to enable the routine. *Poke*359, 57 to disable it. The routine can be saved to take by *CSavem*"code",&H7FD, &H7FFF,359, *CSavem*"vector", 359,361,359

```
MEMORY  DUMP  FOR  ROUTINE

32701 52   23   129  13   39   49  198  0   136  148  5
32712 255  37   38   48   136  224 191  0   136  134  4
32723 198  32   61   195  4    32  31   1   166  128  167
32734 136  223  148  6    0    37  246  134 96   142  5
32745 224  167  128  148  6    0   37   249 53   23   57
32756 190  0    136  140  5    223 37   245 32   205  255
```

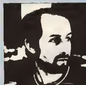
```
ASSEMBLER  SCROLL  PROTECT  ROUTINE

7F8D                50     PRT
7F8D 3417           20 @START  PSHS  X,D,CC
7F8F 818D           20     CMPA  #13
7FC1 2731           20     BEQ  @LF
7FC3 8E0088         20     LDX  $88
7FC6 8C05FF         20     CMPX  #1535
7FC9 2526           20     BLO  @RETURN
7FCB 3088E0         20 @SCROLL  LEAX  -32,X
7FCE 8F0088         20     STX  $88
7FD1 8604           20     LDA  #4
7FD3 C620           20     LDB  #32
7FD5 3D             20     MUL
7FD6 C30420         20     ADDD  #1056
7FD9 1F01           20     TFR  D,X
7FDB A680           30 @LOOP1  LDA  ,X+
7FDD A788DF         30     STA  -33,X
7FE0 8C0600         30     CMPX  #1536
7FE3 25F6           30     BLO  @LOOP1
7FE5 8660           30     LDA  #96
7FE7 8E05E0         30     LDX  #1504
7FEA A780           30 @LOOP2  STA  X+
7FEC 8C0600         30     CMPX  #1536
7FEF 25F9           30     BLO  @LOOP2
7FF1 3517           30 @RETURN  PULS  D,X,CC
7FF3 39             30     RTS
7FF4 8E0088         30 @LF  LDX  $88
7FF7 8C05DF         30     CMPX  #1503
7FFA 25F5           30     BLO  @RETURN
7FFC 20CD           30     BRA  @SCROLL
0167                40     ORG  359
0167 7E7F8D         40     JMP  @START
016A                50     END  @START
```

**Scroll protect**
*by P Whittaker*


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# Tony Bridge's Adventure Corner



## Crawley Manor

*Hareraiser Pt 1 (Prelude)* raised its hairy head a few weeks ago (PCW Vol 3 No 35) in the Corner, when I quoted Gillian Slade's comments on the program. I received, in the following week, several more letters supporting her views (she wasn't happy with it), but, unfortunately, none at all praising it. Haresoft, the authors, then sent me a copy of the program along with several letters endorsing the program. So, what is the program like?

It costs £8.95, so is a little more expensive than the usual Spectrum software — is it worth the extra? The program is very disappointing; a few lines of Basic code and some equally basic graphics, some 26 "locations", with the occasional hopping hare, and, with each picture, a line of rather obscure verse Some of the ambiguous clues (?) are "fast like a river", "stars give extra light" and "help is here", but I haven't the faintest idea what they mean! And, quite frankly, I haven't got the patience to work it all out — but if you enjoyed the *Masquerade* book, and the more recent Cadbury's *Golden Egg* book, then you might enjoy this program (and you won't be digging up the countryside)

However, while there is indeed a very valuable prize awaiting the person who unravels the clues in this program and the follow up, the price seems excessive, especially when one considers that the *Masquerade* book was a sumptuous production, to be kept and savoured over the years (and is cheaper than *Hareraiser*).

On to things of more interest to us adventurers — and the programs of Jyym Pearson. He writes for Adventure International, Scott Adams' company He has written several adventures, but I know nothing about him, except that he created *Escape from Traam, Earthquake (San Francisco 1906), Saigon. The Final Days* and *The Curse of Crowley Manor* The titles all sound pretty intriguing, which I always think is half the battle won. I don't get many letters about these programs, but Kwo-kleung Cheung has written recently from Evesham in Worcester, with a lot of hints — I hope they will help someone in trouble

"I have completed *The Curse of Crowley Manor*, and I tell you, it wasn't easy! Here are some hints: (See the list at the end of the page )

To get the Handaxe and Letter opener — try 6,2,11,14,17,21,7

To open the Rosemary chest: 22,3,12,23,4

To find the Vial. 24,5,13,9

When you are in the Silver Room. 27,18,28

To find the Crystal Ball. 8,20,13,25

Try: 1,26,10,12,19

Nothing to view? Then Listen!

"I have also got quite far on *Earthquake 1906*, which, by the way, I think is far harder than *Crowley Manor*"

Cheung goes on to give a lot of hints, which I will divulge at another time (although I will say that you must be careful of picking up the dog; he can do some nasty things to your trousers!) — meanwhile, he wants to know how to find the Iron Bar Can anyone help?

To finish this week, a Brickbat and a Bouquet. The nice things are said by Debbie Barbe, from Guernsey, who says "I must mention *Dark Lore*, from 8th Day I have actually completed it and would highly recommend it, especially for beginners, as there are plenty of locations to explore, and the problems aren't too hard. There is no help routine but I don't think that is a problem. I would say, though, that you have to go round in circles a few times before you have everything you need!"

This adventure is now getting on a bit, but I, also, quite liked it at the time of its release If you see an advert for it, it seems worth while looking at As I write this, I've just been sent a new range of *Quill*'d adventures by 8th Day Selling at an incredible £1 75, first impressions are extremely favourable — watch this space! The brickbat is hurled by Andrew Willey, of Godalming in Surrey, who writes

"In issue 36 of PCW you asked for opinions of *The Hulk* from Adventure International. Well, as far as I'm concerned, it just demonstrates that pretty graphics (and they are good) don't make up for a small adventure with rather uninteresting puzzles. Maybe I've been spoiled by the wonderful Level 9 series, but Scott Adams has always been the best as far as 'mean' puzzles go In *The Hulk*, they're just not there. Or rather, they're buried in the game design so much that you might not even find them. Take the clue to staying as *The Hulk* for longer, that you printed. Unless you methodically go through all the domes hitting yourself, you just won't find it.

"Of course, there are nice touches — I like the sequence with the Chief Examiner! — and the style is quite a refreshing change from the norm, but there just isn't enough to it.

"Incidentally I've mentioned Level 9 I've heard that the sequel to *Snowball* will include graphics If that's true, it'll be interesting to see how they adapt from being producers of such superior text adventures to the graphic sort I only hope they don't sacrifice too much of the amazing and detail they provide now — worth more than a picture any day!"

By the time you read this, Andrew, Level 9's new program, *Return to Eden*, will be a reality — I'll be reporting on it soon, but Level 9 say that the adventure contains some 250 locations and "masses of puzzles" They say that it "is fully as big as our previous games, with as much text and at least as many puzzles "

And, if you don't like graphics, you can turn 'em off!

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This series of articles is designed for novice and experienced Adventurers alike Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further write to Tony Bridge, Adventure Corner *Popular Computing Weekly* 12-13 Little Newport Street, London WC2H 3LD.

# Peek & Poke



## Bubble Trouble

*David Wilson of Manchester writes*

**Q** **I use my BBC B for business having programmed it to list all the magazines which we deliver to our 800 customers.**

**The magazines, including *Popular Computing Weekly*, are stored on one tape as I find most disc drives expensive. I have however heard of a bubble memory which stores on program for instant access but when I asked Acorn all they would tell me was that it was not one of their products.**

**Could you please tell me if this type of memory will provide the facilites for saving one program and, following alterations twice per week, allow the amended program to be saved again?**

**A** Bubble memory on the BBC, it's an interesting thought. The idea of bubble memory was first brought to my notice in 1969, so it's by no means a new idea. To date though, no one has managed to produce any such storage for anything like a competitive cost when compared to disks.

It is extremely doubtful if bubble memory will become available for the BBC, and if it did would almost certainly cost more than a disc drive.

## Tape to Disc

*P Earley of Southampton, writes*

**Q** **Help . . I'm getting a disc drive for Xmas and I am in a fix. All the programs I like are on cassette. Can I buy the tapes and use a tape to disc copier program to put them on to disc, and then sell the tapes, or is this pirating? Alternatively can I get the shops or manufacturers to put them on disc and charge a little extra.**

**A** This question of transferring software from one medium to another has been asked many times. It is a well known fact that disc owners transfer their cassete programs to disc for convenience and speed of loading. Selling the original tape copies is as much pirating as copying a cassette to a blank tape and then selling the original. Also, whilst some shops and indeed some software houses do offer disc versions of popular software, the majority still provide a cassette only service. Quite frankly, you should follow your own conscience — but I would definitely not sell the original games if I were in your position.

## Typewriter

*Les Rothers of Leeds writes*

**Q** **I don't know if this is up your street or not, but here goes. Besides fiddling away with my 48K Spectrum, I also help out with a Visually Handicapped Drama Group.**

**Once a play has been selected for production, my job is to transfer the play on to cassette, and then the blind person selected for a role has to laboriously transfer my speech into readable script using a Braille typewriter.**

**My query is this: I have heard that there is a new Braille typewriter out, possibly computer controlled, which does the job in half the time, and the script can be read as it comes from the keyboard. Have you heard of such a machine? If so, could you supply me with costs, etc?**

**A** There are a number of Braille typewrites available on the market, but to date I have not been able to locate a dealer who can supply me with a price. One possibility that you might consider following up is to contact the British Computer Society, Portland Place, London. They have a 'special interest group', who are very active in promoting the use of computers by visually handicapped people.

## Data File

*J J Longworth of Darwen, Lancashire writes*

**Q** **On the Vic20, after typing Open 1,1,1 "PROGNAME" Cmd 1; *List* the tape saves data to tape. In the book *Mastering The VIC20'* (where this example comes from) it says that is is an *Ascii* data file.**

**What I would like to know is, what is an *Ascii* data file and how do I retrieve it?**

**A** You may know that the computer holds and recognises charcters using what are called the *Ascii* character codes. These codes are listed in your reference manual. So when the book refers to an *Ascii* data file it simply means that the *Ascii* codes are used when writing your program listing to the tape. You have probably realised that the statements you typed in diverted the normal *List* output from the TV screen to the cassette. To read it back you need to use the *Get#* statement, or the *Input#* statement after of course Opening the file in *Input* mode.

## Saving it

*John Ledbury of London writes*

**Q** **Please can you help me with my Vocabulary Quiz program on my 48K Spectrum? I have English words in A$)W,13) corresponding to foreign words in B$(W,13). I think I have saved them OK by *Let* G$ = A$(W)+B$(W);*Save* " er';1; FOREIGN' *Data* G$(). What I'm trying to do is *Load* G$, find the *Val* of W from its *Len* and then split G$ into A$ and B$. but it doesn't work.**

**I've got a feeling that I could be using *Open#*, but I don't understand this in the manual, and since I need a tape cassette version, I'd be grateful for your comments.**

**A** I presume from your letter that W is not a constant value and that you are not able to determine it from any source other than your saved data.

If you want to save to cas- following approach.

*Dim* A(1):*Let* A(1)=W :*Save* "W" *Data* A() *Save* "ENGLISH" *Data* A$() *Save* "FOREIGN" *Data* B$

Then you simply have to *Load* in your three arrays (remembering to *Dimension* A$ and B$ after reading the value of W). The same principle will apply to microdrive, or disc.

## Loading up

*Bob Ellis of Chester writes:*

**Q** **I have a Model 1 RS 80 with a disc, and I also have a Spectrum.**

**I can use my TRS 80 to work out and store the Z80 machine code and also transfer it to tape, but my problem is in loading it back into the Spectrum. Perhaps a routine for loading the different format could be loaded into the RAM of the Spectrum.**

**A** The different methods of saving and loading programs and data used by the different micro manufacturers is a source of major problems to anyone who is interested in exchanging or converting programs. There is no standard method of achieving the desired effect but it could probably be best achieved by arranging for the TRS 80 to produce Spectrum compatible files on cassette.

The Spectrum Rom contains extensive cassette handling routines (starting at address 04c2 hex) which are described in detail in the *Complete Spectrum Rom Disassembly* by Ian Logan and Frank O'Hara.

By adapting these routines for the TRS 80, I think that you will be able to achieve the desired effect.

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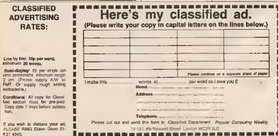
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**SWAP YAESU FT 101Z** H F Transceiver also Yaesu FC 902 A T U for home computer BBC B with software and hardware Carl Whiteabbey 61997 N Ireland

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**TELETYPE WEST REX** (ITT) ASR33 with tape punch reader 20 m A loop v g c. with parts manual £90 Tel Simon 01 534 5414

**APPLE II BUSINESS** System with 5mb hard disk, MX100 printer VDU 5¼" floppy disk, s/w Sale/purchase/nominal/wages Backup available £1 000 + V.A.T

**SHARP MZ 700** tape deck + plotter printer built-in £150 s/w Costs £550 still under guarantee £330 o.n.o Quick sale Tel 01 861 1675

**ORIC 48K HOME** computer for sale. Excellent games machine with lots of memory space for your programmes. With manual software and complete ROM disassembly Sell for £80 00 Tel 0734 733679

**SWAP 48K SPECTRUM** joystick and interface software dust cover cassette recorder (guaranteed) for CBM 64 with C2N Phone 01-907 1204

**COLLECTORS ITEMS** back copies of Popular Computing Weekly including Volume One issues For sale 60p each including postage Please Phone 01-550 7347 (Bickennan)

**SWAP 40 CHANNEL** CB for super charger (Atari) Tel Nasery 0582 599 578

**2 MICRODRIVES** + I/F 2 cartridges £120 (1 month old) Tel Paul 0474 61868

**FOR SALE SV328** with cassette drive joystick and six games tapes also Sprite editor Worth £356 61 now Sell for £280 ono Tel 271 2398 after 4pm.

**MZ 711 INCLUDES** data recorder for sale + £30 software + books and magazines £150 for quick sale Phone Lancaster 0524-39418 after 8pm.

**VICMON MACHINE** book cartridge — £15 "Boss" Chess cassette — £5 (Vic20) Tel 061-453 1812.

**FED UP WITH TYPING** in loads of Spectrum m/c numbers? then send your listing + 70p + 20p for every average screenful of numbers to Martin Peapell 61 Whitworth Road Swindon. Wilts SN2 3BQ

**SPECTRUM GAMES** for sale 48K only — Krakatoa and Mad Martha II £3 Flight Simulation £4 Pimania £8 16K — Froggy and Morris Meets Bikers £3 Yahtzee £2 Martin Peapell 61 Whitworth Road Swindon Wilts SN2 3BQ

**LYNX 28K,** disk drive printer interface and over £80 software All brand new and boxed £400 ono or swap for C64 system with cash adjustment Tel Morecambe (0524) 415435

**APPLE IIE** with disk and monitor books & software DOS and PODOS manuals 3 months old Perfect working order £850 or swap for BBC with disc + cash Aylesbury 748142

**WORDWISE ROM** plus manual will sell for £30 Print-Master ROM and for sale £20 Both are originals Also CYB Mail Merge for Wordwise £15 For details tel Rugby 812940

**TELETEXT DECODER** sell or exchange for Electron plus 1 interface or any other add-ons joystick, adaptors I/O ports A/D converters etc Mr R Mackey Brochroibbie Brora Sutherland Scotland KW9 6NE.

**SHARP MZ 700** 64k almost new with tape recorder and pack of ten games Offers around £200 Quick sale Tel Heywood 64739

**SWAP TEXAS TI994A** for any Spectrum Tel Maidstone 53760

## Wanted

**WANTED BBC** model B. Preferably with cassette recorder £250 cash available 029 921 566

**WANTED TI99/4A** pol position module + only books or literature Tel Mike 0482 868395 after 5pm

**FULLER BOX** with manual and demo tape unused will swap for Currah U Speech and tape or sell for £20 Phone 051 924 [illegible] after 5pm

**SWAP SPECTRUM,** cassette recorder interface I microdrive joystick interface speech synthesiser s/w For CBM 64 + cassette Tel 374 218 Sheffield

**WANTED ONE COMMODORE** 64 with extras Calls Havant (0705) 743966 after 6pm

**SWAP ELECTRIC GUITAR** and amplifier also other bits for 48K Spectrum or 64 column printer or software or anything else Phone Aberdeen 742358 after 8pm. Ask for Alan

**SWAP INTELLIVISION** and 6 games, for 48K Spectrum + Kempston interface + joysticks or sell for £140 ono 01 361 1933 D.E. Lacy

**WANTED** Newbrain technical manual Assembler/disassembler, RS 232 leads details to Andrew Burley 91 Essex Road Southsea Hants PO4 8DG

**SWAP ATARI** 800XL with program recorder plus all leads for Spectrum 48K with leads or will sell for £100 call 393 Pegasus Court Blackbird Leys Oxford

**SWAP £250** 12 speed Peugeot racing bike for Commodore 64 and C2N tape deck. Or sell for £180 ono Phone Middlesbrough (0642) 822998 and ask for Marcel

**SWAP DRAGON 32** with printer/plotter and software also Genie II with expanded twin disc drives and software for Commodore 64 recorder 1541 and good printer Tel 0702 332964 Will travel

**SWAP** Ham International Puma 120 Ch Transceiver PSU aerial value £130 For computer and software of equal value This is a first class transceiver Tel 0294 57164

**WANTED (ORIGINALS)** absolutely any Vic 20 game/utility/adventure (anything) I pay 75p a tape Send tape plus S.A.E to to Gary C Wieriine, Comna West Main Street Blackburn EH47 7LP Scotland

**SWAP PRESIDENT** Madison multimode base station C B + disk desk mike for Oric I 48K or Spectrum Tel Paul Luton 421534 (anytime)

**WANTED NEWBRAIN** + manual Any s/w (no games) Ring 0327 703964

**SWAP MY KEMPSTON** type interface and Quickshot II joystick plus over £106 of top Spectrum software and books for Alphacom 32 or ZX printer phone Warrington (0925) 810403 after 4pm

**SWAP 6X3** snooker table with cues pool balls for Spectrum 0702 540452

**WANTED ZX MICRODRIVE** and interface I for around £60 andne 01 907 1204

**SWAP £65 OF C64** Software Quickshot II joystick HCW since August 1983 For Brother HR 5 Alphacom 42 or C64 Printer Tel 045 275 494 after 4pm. Ask for Martyn

**ORIC MCP-40** printer centronics cable new pens paper £60 Oric-1 16K computer with Oricmon Assembler "Oric Companion" book Game £90 phone Belfast 671734

**SPECTRUM S/W** wanted, the prize, Rapscallion Star Trader Hulk, and any new games. Will pay £3-5.00 Phone 368-3784 London ask for Sam. after 4.30pm

**WANTED 48K** Spectrum Oxford area. Tel Wantage (02357) 65856

## ADVENTURE HELPLINE

**Inca Curse on Spectrum** I can't get any points or get through the portable or past the fire room. Gareth Crooks, 1 Hospital Cottages, Bridge Street, Clay Cross, Derbyshire.

**Adventureland on Vic20** I find it impossible to collect thirteen treasures when one has to be given the bear so that I can collect two other treasures. Darren Reynolds, 8 Fernbridge Way, Bentley, Walsall, West Midlands.

**Hobbit on Spectrum**. After arriving in the goblin's cavern lit by torches I am unable to escape — always returning to the goblin's dungeon. M A Fitzgerald, 37 High View Avenue Grays, Essex.

**Siren City on Commodore 64**. I can't seem to destroy the clouds of gas or the bombs. Please can you tell me how to do it. Andrew Fowler, 66 Lime Way, Davyhulme, Manchester

**The Quest on Commodore 64.** I cannot get out of the first set of rooms. I have got the sword out of the rock floor but don't seem to be able to get any further. Keith Irving 42 Abbey Crescent, Kinloss, Forres, Morayshire

**Ten Little Indians on Commodore 64.** I can't get any further than downstairs or upstairs. S Gardiner, 3 Fry Close Hamble Southampton.

**Quest on Spectrum**. I keep getting stuck, I can't survive the attacks, I can't solve the clues and am now nearly confused. Michael Donaldson, 27 Langtree Close, Bude Road, Bransholme Hull.

**Hobbit on Commodore 64.** I can't get past the goblins gate Andrew Hampton, 105 Vincent Road, Becontree, Dagenham, Essex RM9 6AL

**Magic Mountain on Spectrum**. How do you get up the other side of the vast crevasse? And how do you get through the cave entrance? Debbie Barbé, Vista du Guet, Cobo Road, Castel, Guernsey, Channel Islands.

**Ten Little Indians on Commodore 64** How do you open the large wall safe in the study and is there anything you can do to the couch in the lounge? I A Davidson, 44 Glenwood Gardens, Bedworth Warwickshire.

**Adventureland on Vic20** How do you pass the bear without giving it the honey? D Currie 14 Turnberry Court, Kilwinning Ayrshire.

**Hitch Hikers Guide to the Galaxy on Spectrum**. How do you get past the Algolian Sun Tiger? What are the uses of the mouse, the metal plaque, the net and the poster J T Molson, 2 Chiltern View Saunderton, High Wycombe, Bucks.

**Castle of riddles on BBC** I cannot get through the jet black maze having done the other two passages. Isobel Michael, Easledown, St Swithuns, Winchester, Hants SO21

**The Hobbit on Spectrum**. I were NE from the great river and then tried to go E but got 'You cannot go East, the place is too full to enter' Is this a fault? I B Young, 30 Ravenswood Drive, Glenrothes, Fife, Scotland.

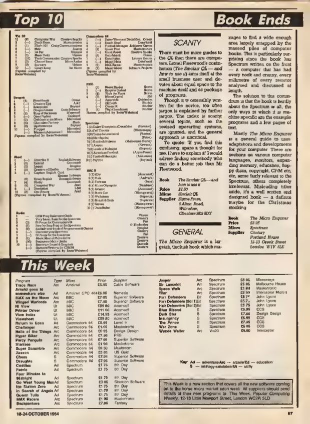
**Voodoo Castle on Vic20** How do you shrink? How do you get into the room up the flue? And where is the doll? Lee Borrell, 73 North Road, Audenshaw Manchester

**Hobbit on Spectrum.** I don't know where to go when I've got the Dragon's treasure Philip Benger 63 Oakleigh Avenue, Edgware, Mddx.

**The Hobbit on Spectrum**. I can kill the dragon and return with the treasure but my score remains at 60–70 per cent. How can I improve it? Neil Exton, 64 Bridge Way, Shawbury Shrewsbury Salop

## Diary

| Event | Dates | Venue | Admission | Organisers |
|---|---|---|---|---|
| Computer Dealers and Systems Retailer Show (trade only) | Oct 17 18 9.00am-8.30pm | Novotel London W6 | Free | [illegible] Exhibitions 0992 [illegible] |
| Home Computer Exhibition and Dealers Fair | Oct 20 12.00pm-[illegible]pm Oct 21 10.00am-6.00pm | Luton College of Higher Education | £1.50 adults £1.00 children | Shaw and Milburn [illegible] |
| Electron and BBC Micro User Show | Oct 25-27 10.00am-6.00pm Oct 28 10.00am-6.00pm | Alexandra Palace London N22 | £3.00 adults £2.00 children | Database Publications 061-456 8383 |
| Show Tech 84 | Oct 26-28 10.00am-6.00pm | Bristol Exhibition Centre | £1.50 adults £1.00 children | [illegible] Exhibitions 0272 [illegible] |
| Computers in Action | Oct 30 10.00am-6.00pm Oct 31 10.00am-6.00pm Nov 1 10.00am-6.00pm | [illegible] Centre Glasgow | Free | [illegible] Exhibition 041-[illegible] |
| Mycomp (Thames Valley Personal Computer Exhibition) | Nov 1-3 10.00am-6.00pm Nov 4 11.00am-5.00pm | Fulcrum Centre Slough | £2.00 adults £1.00 children | [illegible] |
| Home Computer Show | Nov 7 9.00am-8.00pm Nov 8-10 12.30pm 8.00pm Nov 11 12.00pm-6.00pm | Royal [illegible] Society (Main Hall) [illegible] | £2.00 adults £1.00 children | [illegible] Exhibition Centre [illegible] |
| Barrow-in-Furness Computer Fair | Nov 10 10.30am-5.00pm | [illegible] Pavilion Gardens Furness | £1.50 adults 50p children | Technical Promotions [illegible] |
| Home Computer Exhibition | Nov 10 10.30am-5.00pm | David Davies Gallery Newtown Powys Wales | 30p | Newtown and District Computer Club [illegible] |
| Microelectronics Applications | Nov 10 10.00am-4.00pm | [illegible] High School [illegible] Lancs | | [illegible] High School [illegible] |
| London Micro Market | Nov 10 10.00am-6.00pm Nov 11 10.00am-4.00pm | Wembley Exhibition Centre | £1.50 adults 75p children | ECC Publications 01-[illegible] |
| 6809 Colour Show for Dragon and Tandy Users | Nov 17 18 10.00am-6.00pm | Royal Horticultural Halls London SW1 | £2.50 adults £1.00 children | Computer Marketplace 01-930 [illegible] |



# Top 10

**Vic 20**

| | | | |
|---|---|---|---|
| 1) | (9) | Computer War | Creative Sparks |
| 2 | (—) | Duck Shoot | Mastertronic |
| 3 | (1) | Flight 015 | Craig Communications |
| 4 | (—) | Miner | Anirog |
| 5 | (—) | Jet Pac | Ultimate |
| 6 | (3) | Shoot Gold | [illegible] |
| 7 | (10) | Tank Commander | Creative Sparks |
| 8 | (2) | Chariot Race | Micro Antics |
| 9 | (7) | [illegible] | [illegible] |
| 10 | (—) | Crazy Kong | Int. Micro |

(Figures compiled by Boots/Websters)

**Dragon**

| | | | |
|---|---|---|---|
| 1 | (4) | Hunchback | Ocean |
| 2 | (—) | Chuckie Egg | A&F |
| 3 | (—) | Kriegspiel | Beyond |
| 4 | (—) | Dragon Chess | Oasis Software |
| 5 | (2) | Ring of Darkness | Wintersoft |
| 6 | (—) | [illegible] | [illegible] |
| 7 | (3) | Cuthbert in the Mines | Microdeal |
| 8 | (5) | Chocolate Factory | Shards |
| 9 | (8) | Up Periscope | Beyond |
| 10 | (—) | Frogger | Microdeal |
| | (—) | Mansion Adventure 1 | Microdeal |

(Figures compiled by Boots/Websters)

**Atari**

| | | | |
|---|---|---|---|
| 1 | (—) | Airstrike II | English Software |
| 2 | (8) | Zaxxon | Centresoft |
| 3 | (10) | Leggit | Imagine |
| 4 | (9) | Caverns of Khafka | Centresoft |
| 5 | (—) | Captain Sticky's Gold | English Software |
| | (6) | [illegible] | Thorn Software |
| 7 | (4) | Slinky | Centresoft |
| 8 | (9) | Computer War | Atari |
| 8 | (—) | [illegible] | [illegible] |
| 10 | (8) | [illegible] | Atari |

(Figures compiled by Boots/Websters)

**Books**

| | | | |
|---|---|---|---|
| 1 | — | CBM Prog Reference Guide | [illegible] |
| 2 | — | Very basic Basic for the Spectrum | Century |
| 3 | (3) | 60 Progs for Commodore 64 | Pan |
| 4 | (5) | Step by Step Prog on the Spectrum | © Kindersley |
| 5 | (9) | Sinclair user book of Programmes & Games | Imagine |
| 6 | (—) | Discover your Spectrum | Century |
| 7 | (—) | 60 Progs for the Spectrum | Pan |
| 8 | (8) | [illegible] of Micro Drive | Creative |
| 9 | (10) | Beginners Micro Guide | Creative |
| 10 | (—) | Spectrum Sound & Graphics | Granada |
| | (—) | Software Systems for CBM 64 | Creative |

(Figures compiled by Boots/Websters)

**Commodore 64**

| | | | |
|---|---|---|---|
| 1 | (—) | Daley Thompson's Decathlon | Ocean |
| 2 | (—) | Beach Head | [illegible] |
| 3 | (—) | Football Manager | Addictive Games |
| 4 | (4) | Space Pilot | Mastertronic |
| 5 | (—) | Black Hawk | Creative Sparks |
| 6 | (8) | Hunchback | Ocean |
| 7 | (—) | Kensington | Leisure Genius |
| 8 | (—) | [illegible] Mole | [illegible] |
| 9 | (5) | BMX Racer | Mastertronic |
| 10 | (7) | Manic Miner | Software Projects |

(Figures compiled by Boots/Websters)

**ZX81**

| | | | |
|---|---|---|---|
| 1 | (2) | Shoot Raider | Novus |
| 2 | (—) | Krypton Ordeal | Novus |
| 3 | (1) | Walk the Plank | Novus |
| 4 | (3) | Micro Crystal | PSS |
| | (—) | Asteroids | Quicksilva |
| | (—) | ZX Forth | Sinclair |
| | (—) | Chess 1K | Sinclair |
| 8 | (4) | Flight Simulation | Sinclair |

Figures compiled by Boots/Websters)

**Spectrum**

| | | |
|---|---|---|
| 1 (2) | Daley Thompson's Decathlon | [illegible] |
| 2 (4) | Full Throttle | (Micromega) |
| 3 (8) | Tornado Low Level | (Vortex) |
| 4 (4) | Matchpoint | (Psion) |
| 5 ( ) | Sherlock Holmes | (Melbourne House) |
| 6 (1) | Avalon | (Hewson) |
| 7 (3) | Lords of Midnight | (Beyond) |
| 8 (7) | American Football | (Argus Press) |
| 9 ( ) | Football Manager | (Addictive) |
| 10 ( ) | Psytron | (Beyond) |

**BBC B**

| | | |
|---|---|---|
| 1 (1) | Elite | (Acornsoft) |
| 2 (3) | Frak | (Aardvark) |
| 3 (2) | Fortress | (Pace) |
| 4 (4) | Micro Olympics | (Database) |
| 5 (5) | Aviator | (Acornsoft) |
| 6 (9) | Stock Car | (Micropower) |
| 7 (8) | [illegible] | (Superior) |
| 8 (6) | Smash & Grab | (Superior) |
| 9 (7) | Ghouls | (Micropower) |
| 10 ( ) | Dune Rider | (Micropower) |

# Book Ends

## SCANTY

There must be more guides to the *QL* than there are computers. Lionel Fleetwood's contribution (*The Sinclair QL — and how to use it*) aims itself at the small business user and devotes about equal space to the machine itself and as package of programs.

Though it is ostensibly written for the novice, too often jargon is explained by further jargon. The index is scanty: several topics, such as the revised operarting systems, are ignored, and the general approach is uncritical.

To quote 'If you find this confusing, spare a thought for me. I have to explain it!' I would advise finding somebody who can do a better job than Mr Fleetwood.

**Book** *The Sinclair QL — and how to use it*
**Price** *£7.50*
**Micro** *Sinclair QL*
**Supplier** *Sigma Press, 5 Alton Road, Wilmslow, Cheshire SK9 5DY*

## GENERAL

*The Micro Enquirer* is a largeish, thickish book which manages to find a wide enough area largely untapped by the massed piles of computer books. This is particularly surprising since the book has Spectrum written on the front — a computer that has had every nook and cranny, every millimetre of every resistor analysed and discussed at length.

The solution to this conundrum is that the book is hardly about the Spectrum at all, the only ways in which it is machine specific are the example programs and a few pages of text.

Mostly *The Micro Enquirer* is a general guide to uses adaptations and developments for your computer. There are sections on various computer languages, monitors, expanding memory, education, floppy discs, copyright, CP/M etc, etc, some fairly relevant to the Spectrum, others completely irrelevant. Misleading titles aside, it's a well written and designed book — a definite maybe for the Christmas stocking

**Book** *The Micro Enquirer*
**Price** *£8.95*
**Micro** *Spectrum*
**Supplier** *Century, Portland House, 12-13 Greek Street, London W1V 5LE*

# This Week

| Program | Type | Micro | Price | Supplier |
|---|---|---|---|---|
| Trace Race | Arc | Amstrad | £5.95 | Cable Software |
| Arnold goes to somewhere else | Ad | Amstrad CPC 464 | £6.95 | Nemesis |
| BMX on the Moon | Arc | BBC | £7.95 | Superior Software |
| Winged Warlords | Arc | BBC | £7.95 | Superior Software |
| Hi View | Ut | BBC | £59.80 | Acornsoft |
| Printer Driver | Ut | BBC | £11.50 | Acornsoft |
| View Index | Ut | BBC | £14.95 | Acornsoft |
| Viewsheet | Ut | BBC | £59.80 | Acornsoft |
| Return to Eden | Ad | Commodore 64 | £9.95 | Level 9 |
| Challenger | Arc | Commodore 64 | £1.95 | Mastertronic |
| Halls of the Things | Arc | Commodore 64 | £9.95 | Design Design |
| Hyper Biker | Arc | Commodore 64 | £7.95 | PSS |
| Percy Penguin | Arc | Commodore 64 | £7.95 | Superior Software |
| Starrace | Arc | Commodore 64 | £1.99 | Mastertronic |
| Super Scramble | Arc | Commodore 64 | £6.50 | Mushroom |
| Zaxxon | Arc | Commodore 64 | £9.95 | US Gold |
| Chess | S | Commodore 64 | £7.95 | Superior Software |
| Draughts | S | Commodore 64 | £7.95 | Superior Software |
| Cuddles | Ad | Spectrum | £1.75 | 8th Day |
| Faerie | Ad | Spectrum | £1.75 | 8th Day |
| Four Minutes to Midnight | Ad | Spectrum | £1.75 | 8th Day |
| Go West Young Man | Ad | Spectrum | £3.95 | Stockton Software |
| Ice Station Zero | Ad | Spectrum | £1.75 | 8th Day |
| In Search of Angels | Ad | Spectrum | £1.75 | 8th Day |
| Quann Tulla | Ad | Spectrum | £1.75 | 8th Day |
| BMX Racers | Arc | Spectrum | £1.99 | Mastertronic |
| Backpackers | Arc | Spectrum | £7.95 | Fantasy |
| Jasper | Arc | Spectrum | £6.95 | Micromega |
| Sir Lancelot | Arc | Spectrum | £5.95 | Melbourne House |
| Space Walk | Arc | Spectrum | £1.99 | Mastertronic |
| Tiler | Arc | Spectrum | £5.50 | Interceptor Micro's |
| Hair Defenders | Ed | Spectrum | £5.75 | John Lyons |
| Hair Defenders (Sol 1) | Ed | Spectrum | £5.75 | John Lyons |
| Hair Defenders (Sol 2) | Ed | Spectrum | £5.75 | John Lyons |
| Blue Riband | S | Spectrum | £5.95 | CCS |
| Dark Star | S | Spectrum | £7.95 | Design Design |
| Insurgency | S | Spectrum | £5.95 | CCS |
| The Prince | S | Spectrum | £7.95 | CCS |
| War Zone | S | Spectrum | £5.95 | CCS |
| Wunda Walter | Arc | Vic20 | £6.00 | Interceptor |

Key: Ad — adventure/Arc — arcade/Ed — education/ S — strategy-simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to This Week, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD

# New Releases

## BIZARRE

*Swag* is a two player game for the Electron — I always wonder about two player games — how well do they do, are there enough friends to go around? Still, ours not to reason why

The game is quite neat actually — the objective is to steal £250,000 worth of diamonds before the other player Diamonds appear randomly on the screen and can be simply picked up and taken to a cache in your house — provided you get there first and can fight off the insurance company's droids.

In fact, the droids are trained only to go after one player or the other, but you change everything around by moving to certain places — other squares send your rival back to his home, shooting a police car makes it follow you around the screen, drinking a can of beer stops it. A bizarre game but fun.

**Program** *Swag*
**Price** *£9.95*
**Micro** *Electron*
**Supplier** *Micro Power, Sheepscar House, Sheepscar Street South, Leeds LS7 1AD*

## AMAZING

*Tiny Code* is a unique development program for the Spectrum which uses a reduced set of machine-code instructions to guide people into the heady delights of machine-code programming

The program is by Amazing Games, a curious company that have been releasing middling Spectrum software for quite a while

The program is basically a simple user-friendly assembler that comes with a largish manual explaining the main commands available and how to use them.

For the price it's a reasonable try at something a bit different and I've certainly seen far worse packages from more well known companies.

**Program** *Tiny Code*
**Price** *£3.50*
**Micro** *Spectrum*
**Supplier** *Amazing Games, 38 Maple Drive, Burgess Hill, West Sussex, RH15 8EX*

## 3D QUEST

Hill MacGibbon, the book publishers, moved into software a while ago and some of the first programs are now available Many of the education programs are intended for the fairly young but two of its adventures, *King Arthur's Quest* and *Aztec* could find themselves with a bigger audience

Both of the programs were written by Five Ways which also wrote the *Lone Wolf* programs for Hutchinson. All the Five Ways programs are marked by a finanees of deail and care over things like redefined graphics sets for text that set them apart from the norm.

*King Arthur's Quest* sets you the task of removing an evil spell cast by the wicked Morgana — you move through a three dimensional representation of the magical world of Camelot wherein there are strange characters both good and bad, helpful and unhelpful.

The only respects in which the program 'panders' to children are the lack of complex logical problems in the game and the fairy tale atmosphere that fills much of it. Certainly I don't think the fact that it is intended for children should put you off.

The 3D effect is nothing special, just a lattice that has been drawn with perspective and all the commands are simple single key presses, but it has a nice sense of atmosphere and is surprisingly addictive. Well worth a look

**Program** *King Arthur's Quest*
**Price** *£7.95*
**Micro** *Spectrum*
**Supplier** *Hill MacGibbon, 92 Fleet Street, London, EC4Y 1DY*

## BLOCKS

Rolf Harris has endorsed the latest Commodore release for the 64 In fact Rolf helped design some elements of the program, which is a kind of artists drawing program for kids *Rolf Harris' Picture Builder* uses a number of differently shaped blocks which may be combined to create pictures

Children should find it easier to use than normal designer programs since all commands can be expressed by simple joystick controls. With 254 shapes to choose from (an entire redesigned charcter set) it's possible to get some fairly attractive and results without too much effort. Anyway if Rolf's endorsed it, it must be OK.

**Program** *Rolf Harris' Picture Builder*
**Price** *£9.95*
**Micro** *Commodore 64*
**Supplier** *Commodore Business Machines, 1 Hunters Road, Weldon Industrial Estate, Corby, Northants*

## NO SPRITES

Yonks ago Queen (the rock band) used to proudly place the message 'no synthesisers' on their record sleeves Equally meaningful is the proud assertion made by Design Design of *Dark Star* 'no sprites' it says

True enough *Dark Star* has no sprites whatsoever. What you get instead is an epic space game vaguely like *Star Trek* or *Codename Mat*, but with the emphasis placed on vastness rather than on graphics.

Pick of the week

## ROBOT CITY

Hard core adventure fans and all persons of taste and discernment will be delighted to hear that the sequel to *Snowball*, *Return to Eden* is now available for almost every micro Not only that, but it has graphics — around 250 locations are illustrated (although not, as ever, on th BBC version)

One of the virtues of *Return to Eden* is that the plot is so detailed, complex and rich that it is almost impossible to summarise, so we'll just skip that, shall we Oh, alright then, it goes like this. Kim Kimberley has saved the spaceship Snowball 9 from disaster but has been mistakenly branded as a murderer He escapes on a lifeboat and comes to rest on the planet Eden, populated only by various hostile beings and a robot city, now read on ...

As with previous Level 9 adventures, you get more locations and a wider vocabulary than almost anywhere else. You'll need it A mandatory purchase for adventure fans everywhere Tony Bridge will go gaga.

**Program** *Return to Eden*
**Price** *£9.95*
**Micro**
**Supplier** *Level 9 Computing, 229 Hughenden Road, High Wycombe, Bucks HP13 5PG*

There are essentially three elements to the game. Space (the final frontier) in which a whole variety of baddies can be found, hyperspace gates which take you from one sector to another and planets over the surface of which you may skim. On the planets, you must find and destroy several surface towers — destroy the enemy bases they protect and you may liberate the planet and escape from it

The idea of the game is to wipe out all the enemy bases on all the planets in the universe Controls are kept to a relatively simple up, down, left, right, faster, slower, fire and a special key to show you a tactical map to the area

DARK STAR

Design Design

The graphics are clever — the kind of vector line displays found in the old asteroids gmes, but souped up to provide a 3D illusion. Chances are you will either find this one vast, fast and astonishing or deeply repetitive and boring.

| | |
|---|---|
| **Program** | *Dark Star* |
| **Price** | *£7.80* |
| **Micro** | *Spectrum* |
| **Supplier** | *Design Design<br>125 Smedley Road<br>Manchester M8 7BS* |

## BRAINLESS

*Want to blast everything under the sun? Shoot anything that moves? Bored by games requiring stratgy and thought? Couldn't care less whether you find the elvenking's magic sword or not? Ad Infinitum is what you want.*

This aptly named game consists of 256 levels of alien bashing, round ones, square ones, diagonal ones, floaty ones, ones that shoot across the screen, vicious ones and cuddly ones No matter what type, you kill them, and every time you wipe out one batch, another one comes along ad infinitum.

Aside from blasting you have only two other considerations — firstly if you blast too intensively your laser may overheat so watch your level, and secondly from time to time you have to dock for extra fuel bonus Brainless, brutal and repetitive — should do well.

| | |
|---|---|
| **Program** | *Ad Infinitum* |
| **Price** | *£7.80* |
| **Micro** | *Commodore 64* |
| **Supplier** | *Mr Chip<br>8 Caroline Road<br>Llandudno<br>Gwynedd<br>LL30 2TY* |

## EYEVIEW

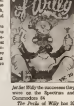
There's still some independent software around for the Dragon although *The Human Eye* is not the kind of program with which to make a fortune. It is simply, as educational program in which a cross-section of the human eye is slowly built up with a brief text explaining each part.

It has to be said that, despite being in machine code, graphically it is nothing much to look at — but that may be the Dragon's fault as much as the programmer's *There* just isn't that much to the program — in a book it would account for no more than a couple of pages of text

| | |
|---|---|
| **Program** | *The Human Eye* |
| **Price** | *£5.95* |
| **Micro** | *Dragon 32* |
| **Supplier** | *A Hearn<br>64 Hillside Road<br>Saltash<br>Cornwall* |

## LOONY

*The Perils of Willy* should give Vic20 owners glum over the apparent demise of their machine something to smile about. The problem is it needs 16K expansion, but if you have it then you can get a real flavour of what made *Manic Miner* and




*Jet Set Willy* the successes they were on the Spectrum and Commodore 64

*The Perils of Willy* has 33 screens of brain befuddling action. The things that made Willy great are all here — loony animals, bizarre bouncing things, seemingly unreachable objects that somehow must be reached, and astonishingly difficult obstacles to be passed.

The plot, such as it is, involves trying to find your way home after a riotous party — skip over the ducks and watch out for the trains Marvellous fun and worth buying or stealing a memory expansion for

| | |
|---|---|
| **Program** | *The Perils of Willy* |
| **Price** | *£5.95* |
| **Micro** | *Vic20 (20K)* |
| **Supplier** | *Software Projects<br>Unit 1 Bearbrand Complex<br>Allerton Road<br>Merseyside* |

## AMSTRAD

*Ghouls* is a sort of Willy type program with a touch of pacman thrown in just in case As such it would hardly merit very much attention but it is for the Amstrad being supported by growing numbers of new suppliers.

Although Miner-like, *Ghouls* isn't really in the same league — for one thing there are only four screens On the other hand perhaps it's not really relevant to compare one machine's programs with another and *Ghouls* is not actually a bad game

The idea is to run through a creepy mansion dodging the ghouls in question and leaping and springing your way over spikes, moving platforms and up to overhanging ledges.

| | |
|---|---|
| **Program** | *Ghouls* |
| **Price** | *£6.95* |
| **Micro** | *Amstrad* |
| **Supplier** | *Micro Power<br>Sheepscar House<br>Sheepscar Street South<br>Leeds LS7 1AD* |

## LESSON

There are, it would seem, quite a few religiously committed people involved with computers — this is certainly a sign of something or other sociological Computers are wholesome.

Anyway, Spectrum owning five to 11 year olds are going to be able to learn all about Moses, Jesus, the choven people, the last supper, and raising people from the dead. If this isn't enough, you get to hunt for buried treasure as well.

The game consists of moving a little figure that looks like a walking black post box around various maps of various holy lands.

To go to the right place, you will need to consult your Bible, preferably a modern version. For those few households that lack a Bible, there is a sort of best of Bible highlights, which gives you a potted New Testament with hints cleverly revealed by italics or bold print

The game allows you to practise various sections and is generally written in a bouncy colourful way with the Spectrum playing the odd 'oppressed people spiritual' to keep you going At £7.99 for a game almost entirely in Basic it is a bit expensive though, isn't it?

| | |
|---|---|
| **Program** | *History Mystery* |
| **Price** | *£7.99* |
| **Micro** | *Spectrum* |
| **Supplier** | *Argus Press<br>1 Golden Square<br>London W1R 3AB* |

Compiled by Graham Taylor

New Releases is designed to let people know what software is coming on the market If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 3LD

## X-ray masking

Up to one million transistors — the building blocks of all integrated circuits — can now be fitted into the space occupied by just one transistor when the technology was first developed in 1959. In fact, since 1959 the maximum number of components possible on a chip has almost doubled every year.

Unfortunately if that trend is to continue the whizz kids of silicon valley (and Britain) have to perfect some radically new chip manufacturing techniques. Conventional techniques have now all but reached their limit.

Almost every integrated circuit now available is made by the same process. A perfect, man-made, single crystal of silicon is sliced into thin wafers. Each wafer then undergoes an immensely complex series of 'etchings', 'dopings' and 'oxidations'.

Etching begins with covering the wafer in a layer of photoresist (a material which hardens under exposure to ultra violet light) and then exposing it through a mask which shades some areas allowing them to remain soft. These soft areas are then removed by a powerful acid leaving an unprotected surface.

'Doping' involves the implanting of impurities into the pure silicon thereby giving it the controllable semiconducting properties needed for building transistors.

Finally, oxidation of the silicon by heating it in a furnace creates insulating layers. Multiple combinations of these three processes and a large number of different masks in a kind of vertical jigsaw of unbelievable sophistication creates the Z80's and 6502's. However — and here's the crunch — there is a limit to how densely the transistors can be packed. Smaller transistors mean smaller markings on the masks. However these markings can only be as small as the wavelength of the ultra-violet light used for the etching (0·003mm) since at that size diffraction of the light blurs the image on the wafer.

So what can be done to improve the chips of the future?

X rays can be used for masking instead of ultra-violet light — X rays have a much shorter wavelength than UV (0·0001mm) and so the markings on the mask may be made very much smaller. As anyone who has ever broken a bone will know though, X rays pass straight through most substances and so both a new kind of photoresist (to protect the wafer's surface) and a new kind of mask (to shade the relevant areas) need to be developed. This problem has yet to be adequately solved.

Even if it is, X-ray masking would be useless without plasma etching. This technique is an attempt to solve the problem caused by the acid spreading in the etching process. A plasma is simply a gas that has been heated in some way to such a high temperature that the atoms making up the gas are smashed apart into ions (heavy positively charged particles) and electrons (light, negatively charged particles). In the plasma etching process the wafer, covered in photoresist and already exposed, is placed in the plasma of an inert gas such as Argon. The wafer is then made to attract positive ions out of the plasma by making it negatively charged. These ions leave the plasma in large numbers and at high speed where they smash into the photoresist with such energy that it is gradually vapourised (very similar to sand-blasting only billions of times finer). The soft areas vapourise more quickly and so are etched away.

The most exciting development of all is ion beam lithography. A high powered beam of ions is focused by magnets into a very narrow beam (like focussing the suns rays through a lens) of such intensity that it is able to cut the required pattern directly onto the surface of the wafer. The ion beam is controlled by a computer which has the integrated circuit pattern stored in its memory — thus removing the need for any mask at all. The problem with this technique at the moment is that compared with etching, it is quite slow and so its theoretical ability to make chips with 10,000 000 000 transistors per sq cm may be reserved for highly specialised chips.

Whether it's by X ray masking/plasma etching, alternatives to silicon with ion beam lithography it is clear that by the end of this century we will see chips with upwards of 10 000 000,000 transistors per sq cm giving the ability to store ten Encyclopedia Britannicas on a thumb-nail.

But it looks as if that will be as far as semiconductors will be able to go. What then?

**Glen Counsell**

## Here's a clue

**Puzzle No.129**

Here is a crossnumber puzzle, in which it is necessary to fill in the spaces with numbers according to the clues given.

| | | | |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| | | 5 | |
| 6 | | | |
| | 7 | | |

**Clues**

| Across | Down |
|---|---|
| 3) A | 1) $A^2$ |
| 6) A * B | 2) (A + B) * 9 |
| 7) A + B | 4) $B^2$ |
| | 6) B − A |

**Solution to Puzzle No 124**

There are two possible answers.

The garden is either 264 yards long, 170 yards wide with diagonals of 314 yards, or 320 long 72 yards wide with 328 yard diagonals. Both give a total route length of 1760 yards.

In the program the value A represents the longer side of the rectangle, B the shorter, and D the diagonal.

```
10 LET A = 2 20 FOR B = 1 TO A - 1 30 LET D = SQR(A *
A + B * B) 40 LET T = 3 * A + 2 * B + 2 * D 50 LET T =
VAL(STR$(T)) 60 IF T = 1760 THEN PRINT A,B,D 70
NEXT B 80 LET A = A + 1 90 IF A > 352 THEN STOP 100
GOTO 20
```

The program stops when A > 352 since, even with the value B at a minimum, the route (3 * A + 2 * D) is greater than (5 * A). Therefore A must be smaller than 1760/5.

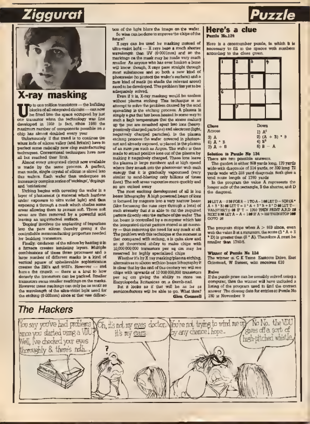
**Winner of Puzzle No 124**

The winner is C K Tame Eastcote Drive, East Grinstead, W Sussex, who receives £10

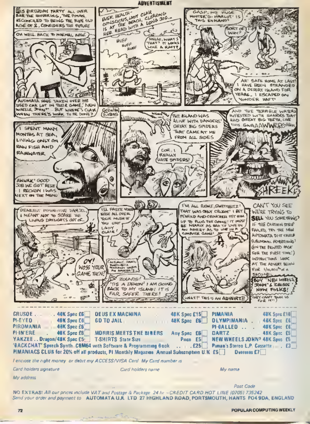
**Rules**

If the puzzle prize can be sensibly solved using a computer, then the winner will have included a listing of the program used to find the correct answer. The closing date for entries to Puzzle No 180 is November 9

## The Hackers




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HIS BIRTHDAY PARTY ALL OVER BAR THE HOOVERING, THE PIMAN, RECONCILED TO BEING THE RIPE OLD AGE OF 2, CONSIDERS THE FUTURE
OH WELL. BACK TO NORMAL NOW!
AUTOMATA HAVE TAKEN OVER ME USED CAR LOT IN THEIR GAME, 'NEW WHEELS, JOHN?' BUT WHERE'S CLAIR WHEN THERE'S WORK TO BE DONE?
EVER HEALTH-CONSCIOUS, LADY CLAIR IS AT THE BEACH, CLEARING HER HEAD WITH A LONG JOG..
HUFF
HUFF
HUFF
HELLO, WHAT'S THAT? IT LOOKS LIKE A RAFT!
GASP. HO HUGE HOOTER'D-HARLOT! IS THIS ENGLAND?
SORT OF WHY?
AH! SAFE HOME AT LAST! I HAVE BEEN STRANDED ON A DESERT ISLAND FOR YEARS. I ESCAPED ON YONDER RAFT!
Gremlin Evans
I SPENT MANY MONTHS AT SEA, LIVING ONLY ON RAW FISH AND RAINWATER
AWWRK! GOOD JOB WE GOT HERE - I RECKON I WAS NEXT ON THE MENU
THE ISLAND WAS ALIVE WITH DANGERS! GREAT BIG SPIDERS THAT CAME AT ME FROM ALL SIDES
COR, I REALLY HATE SPIDERS!
AND THE TERRIBLE WATERS INFESTED WITH SHARKS THAT HAD GREAT BIG TEETH, LIKE THIS GWAAAAWWRRGHHH
SHREEK!
DEAREST DIMINUTIVE DAMSEL, I MEANT NOT TO SCARE THE LIVING DAYLIGHTS OUT OF..
OY! WOSS YOUR GAME, THEN?
I'LL PASTE YOUR NOSE ALL OVER YOUR MUSH IF YOU UNT LADY CLAIR!
ZOUNDS! 'TIS A DEMON! I AM GOING BACK TO MY ISLAND! IT IS FAR SAFER THERE!
I'M ALL RIGHT, SWETTIBITZ! THAT WAS ONLY CRUSOE! I BET PENFOLD AND CROUCHER SET HIM UP TO PLUG THE GAME! IT MUST BE NEARLY AS BAD TO LIVE IN AN ADVERT AS TO LIVE IN A COMPUTER GAME!
WHAT?! THIS IS AN ADVERT?!
CAN'T YOU SEE WE'RE TRYING TO SELL YOU SOMETHING? IF THE CARTOON STRIP FAILED, TRY THE NEW AUTOMATA D.I.Y. YASELF SUBLIMINAL ADVERTISING! (ON THE PRINTED PAGE FOR THE FIRST TIME!) INSTRUCTIONS LOOK AT THE ADVERT BELOW FOR 1/10,000th OF A SECOND.
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